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Attachment in Social Networks

Louis W.C. Tavecchio
Marinus H. van IJzendoorn
Editors

North-Holland

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Contributions to
the Bowlby-Ainsworth Attachment Theory

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Editors:

G. E. STELMACH

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Louis W. C. TAVECCHIO
and
Marinus H. VAN IJZENDOORN
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The Netherlands

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PREFACE

Early childhood research and, for that matter, attachment research have a long history of focusing their attention rather exclusively on parents as the persons who have the major responsibility for the care of their infants during the early years of the baby's life. The mother in particular has for a long time been viewed as the primary caregiver. From the mid 1970's, Michael Lamb and his associates have done important work with respect to the father-infant relationship, thereby adjusting this one-sided view in no small measure. In addition, research in the past decade has given impetus to the exploration of infants' relationships beyond the limits of the family, for example with non-parental caregivers in institutional settings (day care centers or nurseries). In our view, this last development is of particular importance to the impact of current and future early childhood research on child-rearing attitudes and practices. For in present day society, permanent actual presence of the caregiver is virtually impossible in a family in which there is often more than one child to be cared for, and in which the caregiver has to fulfil other responsibilities than bringing up children. In most families, help provided by baby-sitters, neighbors, relatives, friends, professional caregivers and especially the partner is indispensable.

Therefore, the main objective of the research presented in this book is to broaden the scope of attachment theory by stressing the importance of a *social network approach* to the study of attachment. This approach forms the integrating theme of the book, as exemplified by several studies of attachment as it develops in an "extended" rearing context, over and beyond the limits of the traditional mother-child dyad. In this connection, attention is paid to the importance of sibling relationships, attachment relationships with professional caregivers, the role of the father in extending the child's rearing context, and the short and long term effects on attachment quality of maternal employment. In addition, the cross-cultural validity of Ainsworth's Strange Situation procedure will be discussed. In this social network approach, the attachment theory proves to be a particularly useful instrument for reflecting on the consequences for child development of such social change phenomena as maternal employment, symmetrical families, and socialization of children in institutional settings.

The book is divided into four parts. The first part, ***Philosophical and Methodological Aspects***, consists of chapter 1, in which the attachment theory is described from a philosophical and methodological perspective, more specifically in terms of a Lakatosian research program. Part II, ***Extension outside the family: A large-scale approach***, dwells at greater length on several factors outside the context of the nuclear family which may be relevant to the development of attachment. In chapter 2, attachment-relevant behavior of children displayed in potentially threatening situations in everyday life is assessed with the help of the so-called "Perceived Security" scale and is related to such variables as maternal employment, non-parental care, overnight separations and maternal involvement with child-rearing. Chapter 3 stresses the importance of studying the wider social network of the infant in the family, in particular the growing influence of non-parental caregiver-infant relationships in contemporary society. The research reported on in this chapter deals with the ease with which the child adjusts to "strange" non-parental caregivers, as related to type of attachment quality to the mother, and to other behavioral characteristics such as temperament, separation experiences and frequency of visits. Chapter 4 reports on research into the effects of maternal employment and alternative (out-of-home) forms of child care on the quality of attachment. Special attention is paid to separations and to factors within the family that may jeopardize quality of attachment. Chapter 5 discusses (dis)-continuities between quality of mother-infant attachment (as assessed in the Strange Situation) and the child's cognitive/emotional development at kindergarten; three years after their participation in the Strange Situation, mother and child were asked to participate in problem-solving tasks and parents and kindergarten teachers were asked to complete a Q-sort measuring ego-control and ego-resiliency.

Whereas in part II large-scale studies play a prominent role, part III, ***Extension inside the family: A small-scale approach*** is made up of several studies into family dynamics, with small groups of families forming the units of analysis. The first three chapters in this section examine changes in family interaction patterns after the birth of a second child. In chapter 6, the family as a whole, with its multiple relationship network, is taken as a new basis for interpretation.

The consequences of the birth of the second child are studied in terms of changes in the existing father-infant and mother-infant relationships and are related to the development of the relationships between both parents and the newborn. Chapter 7 addresses the same question, this time from a more qualitative ("ethnographic") point of view. In this chapter, the results of a study are discussed in which five families were observed weekly over a period of eight months, as well as the results of a follow-up study carried out three years later. These same five families form the units of analysis of the study reported on in chapter 8. Here, the important intra-familial changes brought about by the birth of a second child are described from a more quantitative perspective. Special attention is paid to the more active participation on the part of the father in child-rearing responsibilities and to the accompanying changes in the father's relationships with both children. Part III concludes with chapter 9, which starts with a critical discussion of four (partial) replications of the well-known Bell & Ainsworth (1972) study on "Infant crying and maternal responsiveness". The present authors conclude that empirical evidence in favor of Bell & Ainsworth's hypothesis is lacking. The chapter continues with the description of a critical replication carried out by the authors themselves at the University of Leiden, in which they tested various hypotheses on the relationship of maternal (un)responsiveness and crying.

The book concludes with part IV, *The Strange Situation: A multinational data set*. Chapter 10 attempts to combine both methodological and substantive aspects and arrive at an integrated solution by applying three-mode principal component analysis to a multinational data set. As the distribution over subgroups is different in all countries, almost all subcategories of the classification are well enough represented to allow for a multivariate study of differences and similarities between the various subgroups. Finally, chapter 11 discusses the development of attachment in young infants as assessed in the Strange Situation and pays special attention to issues related to the instrument's validity outside the USA. Classification results obtained in Japan, West-Germany, the Netherlands and in Israeli kibbutzim are critically reviewed.

Originally, the present volume was conceived as a collection of contributions made solely by the members of the research project "Early Child-Rearing" at the University of Leiden. Once the topic was chosen, however, a small number of guest authors were invited to participate. We are most grateful for the contributions made by Peter K. Smith and Rodney Noble (part II, chapter 3), Kurt Kreppner (part III, chapter 6), and Abraham Sagi and Kathleen Lewkowicz (part IV, chapter 11).

Finally, we would like to acknowledge the important work done by Cora M. Lucassen-Jongsma, who took great pains in typing the final manuscript. We also want to thank Dineke den Boer, Marion van Dam, and Hylda Woudstra for their editorial assistance, and we greatly appreciate the essential contribution of Marc Schoen, who polished up the English text of a majority of the chapters contained in the present volume.

Louis W.C. Tavecchio
Leiden, September 1986 Marinus H. van IJzendoorn

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Part One

PHILOSOPHICAL AND METHODOLOGICAL ASPECTS

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L.W.C. Tavecchio and M.H. van IJzendoorn (editors)
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CHAPTER 1

THE DEVELOPMENT OF ATTACHMENT THEORY AS A LAKATOSIAN RESEARCH PROGRAM: PHILOSOPHICAL AND METHODOLOGICAL ASPECTS

Marinus H. van IJzendoorn and Louis W.C. Tavecchio

ABSTRACT

In this chapter, we analyze the development of attachment theory from a Lakatosian perspective. It is argued that attachment theory should be regarded as a research program, developing through the stages "formulation", "construction", and "saturation". At least two anomalies threaten to block further progress of the attachment research program: The problem of the stability of attachment, and the problem of cross-cultural variability of attachment qualities. After suggesting a solution to the latter problem, we discuss the monotropy-thesis as a "degenerative problem shift". Studying attachment in social networks should be considered a viable alternative.

INTRODUCTION

Attachment theory has seldom been described from a philosophical and methodological point of view. In reviews of the attachment theory, substantive results and problems are emphasized, such as the antecedents of different types of anxious attachments. In this chapter we will not discuss these substantive matters, but we will try to describe the attachment theory as a Lakatosian research program. In the philosophy of science, developments in the natural sciences have been interpreted as paradigmatic or in terms of progressive and degenerating problem shifts, ever since the sensational publication

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of Kuhn's "Scientific revolutions" (1962), and Lakatos' exposition of the idea of research programs (1980). These approaches threw some light on a few very important episodes from the history of the natural sciences (e.g., the "Copernican revolution"), and contributed much to the methodological debate. Although it has been recently suggested that the flaws in Kuhn's theory, and - to a lesser extent - also in Lakatos' conceptions, should be diagnosed as fatal (e.g., Laudan, 1984), we think the fruitfulness especially of the Lakatosian approach has been demonstrated quite well. We refer here to Lakatosian analyses of Piagetian developmental theory (e.g., Beilin, 1984). Furthermore, Gholson and Barker (1985) showed that the age-old controversy between the conditioning research program and the cognitive program could very well be disentangled by a (slightly amended) Lakatosian philosophy of science (see also Barker & Gholson, 1984). Van der Veer (1985) showed the same for the development of the Soviet-Russian cultural-historical theory. Through such analyses, developments in the natural and behavioral sciences become comparable. Therefore, we may learn more from the history of science. Researchers could be alerted to the question of the identity of their research program, to criteria for changing the content of the program, and to the central place of examples of successful research projects and -instruments in "educating" new members of the scientific society. Through a Lakatosian analysis, the development of a research program could possibly be described in terms of stages, and some predictions about future progress and drawbacks could be made.

In this chapter we try to describe in a nutshell the history of attachment theory. It will be shown that this theory not only arose because of the enthusiasm and brilliance of some individual scientists, such as John Bowlby and Mary Ainsworth, but has also been inspired by social changes and current *"Zeitgeist"* (next paragraph). Although attachment and loss have always drawn considerable attention from the public and the policymakers, the popularity and fast expansion of attachment theory since the sixties can especially be ascribed to the construction of a measurement procedure to study the complex phenomenon of attachment between caregiver and child. The Strange Situation procedure (Ainsworth & Wittig, 1969) can be regarded as the proximate cause for the growth of attachment theory towards a full-fledged research program. In learning to apply this procedure, many young and competent behavioral scientists were drawn to and initiated in attachment theory. The collective efforts of dozens of researchers in all parts of the world accelerated the maturation of attachment theory. Parallel to established natural scientific traditions, a standard measurement procedure for attachment provided the common basis for exchange of experiences and for carrying out cooperative research.

At least two consequences of this rapid development can be pointed out. Firstly, hypotheses derived from Bowlby's magnum opus "Attachment and Loss" (1971; 1975; 1980) were empirically specified and verified within a relatively short time. Research soon made clear that sensitive responsiveness for example, constituted one of the main factors in the development of attachment. Empirical evidence showing the effects of different types of attachment for future child development was also produced. Secondly, however, flaws and inconsistencies in the research program were relatively quickly exposed, often as an unintended by-effect of research initiated to make a significant positive contribution to the program. From the perspective of philosophy of science, it is understandable that a fastly developing research program accelerates its own downfall as it is soon tested to its limits. We will show in the last paragraph that attachment theory indeed has maturated very rapidly, and so created its own anomalies. Those anomalies do not yet threaten the existence of the program, but they remain continuing sources of concern and attention. For example, the problem of the stability of attachment quality has not been solved adequately yet, although the social context of attachment has been taken somewhat more seriously into account than before. But even the validity of the Strange Situation procedure has not yet been proved definitely: the status of new attachment classifications (D and B5) and the position of marginal subgroups (B1 and B4) is not clear at all. Differential attachment research into the antecedents and consequences of different classifications is slowed down by technical problems such as small sample sizes with only few observations in relevant subgroups.

Philosophy of science may be used to identify positive and fruitful trends in a research program. In Lakatosian terminology, these trends are called "progressive problem shifts". In the last paragraph we will point to a few progressive problem shifts in attachment theory. Firstly, by applying Lakatosian criteria for amending a research program, we will show that Bowlby's thesis of monotropy has to be replaced by the idea of attachment networks, placing caregiver-child relationships in a social context. Secondly, we will refer to the threat cross-cultural research constitutes to the phylogenetical aspects of the program's hard core. The claims of attachment theory to a universal status are based on the conviction that phylogenesis has resulted in the same genetic inclination towards attachment in all members of the species. Recent results of cross-cultural research seem to falsify this claim, but we will try to show how a Vygotskian interpretation could circumvent the anomaly.

HISTORY AND CONTENT OF ATTACHMENT THEORY

Attachment

"Attachment" is the term for a relatively durable affective relationship between a child and one or more specific persons with whom it interacts regularly (Bowlby, 1971; Ainsworth, Blehar, Waters & Wall, 1978). Children attached to a caregiver will try to remain in his or her direct vicinity, in particular at moments of sadness, fatigue, tension, and fear. In more or less unfamiliar surroundings - a new play area or when visiting strangers - the attachment figure is the secure base from which the environment is explored, and only this person provides a sufficient feeling of security for the child to play freely. Especially under circumstances of stress, the child will resist the departure of and separation from this person, and upon this person's return, it will cling to him or her or express in one way or another joy at the renewed presence of this most important source of security and confidence.

When, however, this separation is protracted - as, for example, during stays in hospital - the child will then cease protesting after a time and assume a "desperate" attitude, sit sadly or apathetically in a corner, hardly accessible for other adults. Of course there does come a time when the child appears to recover, accepting the care of an adult other than its attachment figure, and regaining interest in its surroundings. In the meantime, however, it is clear that it must have felt a particularly strong tie to the caregiver and that breaking that tie has considerable consequences for its feelings of security and (self-)confidence, and for its urge to go out exploring. It is as if that unquestioned base for all its activities has suddenly disappeared. It has great difficulty adjusting to the state of separation and in initiating the development of alternative attachment relationships.It is the very instance of temporary or permanent severance of the attachment relationships that demonstrate how intense and "adult" the emotions of even young children can be: they foster a deep affection towards a specific person and bemoan his or her absence with intense sadness.

Not every child, however, reacts to the absence of its caregiver in the manner described above. There are children who make an indifferent impression when their attachment figure returns. They avoid contact or behave rather ambivalently, by both seeking and rejecting contact, all at the same time. In this way they appear to be expressing either disappointment in the behavior of their attachment figure, or anger at the protracted period of separation. The absence or presence of the caregiver hardly seems to influence their play and exploration behavior either. The question is, which factors lead to different types of attachment relationships and what short- and long-term consequences those relationships have for a child's social-emotional and cognitive development. As suggested earlier, the attachment relationship is a child's secure base for all its activities. How then do we explain the curious phenomenon that in the second half of their first year most children have developed at least one attachment relationship, often to their mother or father? Is this a question of maturation, for example at a cognitive level, through which children are capable of distinguishing their caregiver from arbitrary visitors and can picture him or her in their minds, even in his of her absence? Or is it rather a learning process and therefore due to factors related to the interaction between caregiver and child, for example, in learning to interact successfully in play and other areas?

The same series of questions can also be raised concerning the consequences of different types of attachment. In books for parents about child-rearing, it is repeatedly pointed out that a necessary condition for activities associated with child-rearing is an affective relationship, in which trust between caregiver and child can develop. The caregiver must succeed in winning the trust and affection of the child through interaction preceding intentional child-rearing activities, and in so doing create the framework in which it is prepared to accept the "authority" of the caregiver, even if it is not always clear how this authority is to be legitimized. Does, indeed, the absence of a secure attachment relationship at an early age result in child-rearing problems and therefore in falling behind in cognitive and social-emotional development? And is every type of attachment relationship an equally solid basis for child-rearing?

A first design of attachment theory

In his attachment theory, the English psychiatrist John Bowlby (born in 1907) attempted to give answers to such questions. At first, he had few doubts concerning the right answers. Thirty-five years ago, more than a half million copies of his report on the case of "neglected" children in postwar Western Europe were distributed. In it he concluded that "maternal love" was as important for the mental development of children as were proteins and vitamins for their physical development (Bowlby, 1951, p.159). Inversely, being deprived of or separated from the mother was usually as damaging for the child's "mental" health as were contagious diseases for "physical" health. The absence of a durable attachment relationship in the first year of life would have irreversible consequences for what is called "mental health" or "adaptability". It would result in an unfortunate form of maladjustment to its surroundings, and a lack of confidence in itself and in its fellow human beings in times of need.

Actually, these far-reaching conclusions concerning the short- and long-term effects of "maternal love" and "maternal deprivation" had already surfaced in the two research projects with which Bowlby began his career as psychiatrist-researcher. They concerned clinical studies into the background of juvenile delinquency (Bowlby, 1940; 1944). In this framework, he gave a profile of "petty thieves" on repeated offenses, concentrating upon their seeming lack of emotions. As these children were insensible to guilt feelings or sympathy for their victims, their capacity for theft and other criminal behavior was nearly boundless. In reconstructing their life histories, Bowlby noticed that many of them had had quite a bit of experience with separation in the first three years of their lives. It was in this very stage of life that these children appeared to have spent their time in poorly equipped institutions or to have been sent from one caregiver to another like parcels.

The absence of a continuous attachment relationship appeared to have led to a hardening of these youths' emotional lives, and to have facilitated the step to delinquency. Bowlby generalized this effect of "unfeeling" character development to all educational situations in which the child is unable to develop confidence in the availability and accessibility of a caregiver, that is, to develop an attachment relationship of durable nature.

Bowlby himself traces his interest in separation experiences as an important pathogenic factor to his work at a school for socially and emotionally "maladjusted" children, to which he was associated for six months at the age of 22 (1928-1929). Afterwards, Bowlby stated in a interview with Senn (see Newcombe & Lerner, 1982) that during this period he was able to closely observe the disastrous effects of early childhood separations. His impression that this kind of experiences had far-reaching consequences was strengthened by his therapeutic activities at Maudsley Hospital, where he worked as a clinical assistant from 1933-1936, and was trained as a psychiatrist by Joan Riviere and Melanie Klein. At the time, he had started on a thesis on the loss of a loved one as a cause of psychosis, but never finished it. Instead, his paper on "Personality and mental illness", published later (1942), was accepted in 1939 as "MD-thesis". This was a paper on the classification of types of mental illness, in which attention is also paid to the loss of a loved one as an aetiological factor (Newcombe & Lerner, 1982, p.10). Newcombe and Lerner assert that Bowlby's interest in actual separation experiences as the cause of serious psychological problems can also be traced to the consequences of the First World War on the British population. The premature death of many British men and fathers had a far-reaching influence on the psychological well-being of the survivors, and this was noticeable during therapy sessions. In British psychoanalysis, it was to this kind of real problems that Klein and Suttie in particular responded, using them as a pretext for changing the accepted psychoanalytical options and theories. By stressing on the one hand an innate biologically adaptive need for relations with fellow human beings, and on the other fear of separation and the damaging consequences of actual separations, Suttie approached closely Bowlby's recent version of the attachment theory as far back as the thirties. Social factors (the First World War), intellectual climate (the development of an unorthodox British variant of psychoanalysis), and personal experiences thus form in brief the foundation of Bowlby's preoccupation with attachment relationships, separation and loss. The core of the first wording of the attachment theory, then, is that the absence of a durable attachment relationship during the first years of life leads to problems in future emotional development.

Criticism

The first and very rudimentary formulation of the attachment theory was sharply criticized in the fifties. As regards its content, the theory is based in particular on research into "maternal deprivation" or hospitalism (see for example Spitz, 1976), that is, research into the effects of institutionalization upon the development of the young child. However, residence in a "substitute family" institution does not only mean (permanent) separation from the mother but also from the father, and from other family members and acquaintances. At the same time, the child is separated from its familiar surroundings. In this complex of factors, it is impossible to automatically label the absence of "maternal love", or even of an attachment relationship in general as the most important cause of deviant development. From the research of, for example, Heinecke and Westheimer (1965, p.192f), it appears that the conditions surrounding a separation and admission to a "substitute family" institution are of great importance to these short and medium range effects.

Children, for instance, admitted together with a brother or sister react much less vehemently than children having to adjust to new living conditions without other family members. Characteristics of the institution itself must also be considered as possible intervening variables. In the institutions investigated by Spitz, overcrowded and poorly staffed due to the many "war-orphans", he discovered for example a relative lack of environmental stimulation.

In particular, Pinneau (1955) and Rutter (1971) level similarly devastating and as yet unrefuted methodological criticism at this type of hospitalism and maternal deprivation research. However, Bowlby's first effort to explain the vehement and stereotypical emotional reactions to separation and loss constitutes an important step away from the established interpretations. In traditional psychoanalysis as well as in conditioning theories, attachment relationships were considered to be based upon the child's need for food and physical care. A caregiver satisfying these primary needs would therefore become the target of a secondary (attachment) need, through repeated association of need satisfaction and the presence of the caregiver. Research on the development of children from institutions, however, had made clear that perfect physical care is not a decisive factor for the existence of an attachment relationship. The famous experiments of Harlow (1958; 1961) with separated nonhuman primates demonstrated that a baby monkey felt more attached to a soft-covered "artificial mother" that provided no feeding, than to a bare "wire mother" that did. Feeding alone appeared to be a neither sufficient nor necessary condition for the development of affective ties in monkeys. In short, psychoanalysis and conditioning theories cannot explain why attachments develop when no association with satisfaction of primary needs is present. It is Bowlby's merit to have constructed an alternative explanation by combining evolutionary, system-theoretical, and psychological approaches.

Evolutionary roots of attachment

An important thesis in attachment theory is that human attachment behavior has biological roots that can only be understood from an evolutionary perspective (Bowlby, 1971). Certain behavior is of great benefit to the survival of the species or population and in the course of evolution is stored in the genetic material and transmitted to younger generations. The attachment theory assumes that there are a number of genetically determined biological safeguards ensuring pedagogical care during the long period of childhood helplessness. This applies especially to the child's behavioral repertoire, of which attachment behavior such as seeking proximity and crying would be a part. Of course, the survival value of attachment behavior cannot automatically be determined on the basis of dangers threatening the child in contemporary Western society.

In order to do so, one must, according to Bowlby, return to the "environment of evolutionary adaptedness", the environment in which the species developed during an evolutionary period of millions of years. Bowlby states that in this environment, the attachment behavior of the immature members of the species, and its parental equivalent, had the function of protecting the offspring from danger, in particular from attacks by predatory animals. Even now, in an environment that in the past thousands of years has become far removed from the original environment, the genetic transfer of the inclination towards optimal adaptation continues to exist. This means that in its present environment, the child continues to retain the inclination to grow "attached" to its caregiver, that is to be mindful of keeping the caregiver at a "safe distance" (or better said, a safe proximity). The basis for the origin of attachment behavior should therefore not be sought in momentarily rewarding feeding or care and the contact often accompanying it, but in the biological function this behavior fulfilled during the millions of years of struggle for survival in the original living environment of the human species.

In this evolutionary explanation, the question of the origin and function of adequate parental reactions to their children's attachment behaviors remains unanswered. Why should an adult be responsive to the genetically biased proximity and contact seeking of every infant? Porter and Laney (1980) and Lamb, Thompson, Gardner and Charnov (1985) point to the importance of the concept of maximization of the "inclusive fitness" in recent advances of evolutionary biology. Inclusive fitness refers to every individual's tendency to enlarge the number of his or her genes. Influenced by recent trends in sociobiology, in fact the gene-pool and not individuals or species are considered the central theoretical entities in evolution. Without evaluating this idea, one could derive that parental maximization of inclusive fitness only to a certain degree implies a responsive reaction to the child's signals. One could imagine, for example, that a responsive reaction would have negative consequences for other children in the family and, therefore, would decrease total parental inclusive fitness. Natural selection would force parents to strive toward an optimal balance between costs and benefits regarding reproductive success. This implies the necessity to react responsively, but also the possibility of neglecting the child's attachment signals in favor of a sibling's need for security. Under these circumstances, children would be optimally adapted to their environment if they know how to handle temporary parental unresponsiveness (Lamb et al., 1985, p.47; Hinde, 1982). An anxious-avoidant or resistant attachment would sometimes constitute a good adaptation to a (temporarily) insensitive environment.

This same evolutionary perspective has been introduced into conditioning theories of attachment (Petrovich & Gewirtz, 1985). Proximate causes for attachment behavior, such as its conditioning history, are complemented with more "ultimate" considerations. In this recent variety of conditoning theory, the central thesis is that parental attachment behavior enlarges the inclusive fitness of the individuals (p.283). Not only protection against predatory animals is important: parental behavior has to be interpreted in the context of a broader strategy of maximization of reproductive success. The more genes caregiver and child have in common, the more probable responsive reaction to the child's attachment signals is. This responsiveness is called "psychobiological attunement" (Field, 1985). In this respect, attachment theory and conditioning theories converge at the same evolutionary notions. Differences of opinion arise on the level of proximate antecedents of an individual attachment relationship. Conditioning theory postulates certain kinds of conditioning mechanisms, while attachment theory emphasizes control-system operations (see next paragraph).

Evolutionary explanations for a genetic bias of attachment make a very speculative and metaphorical impression. They do not take into account the existence of a cultural heritage and capitalize exclusively on the biological heritage (Van IJzendoorn & Van der Veer, 1984). But caregivers, of course, do not only consist of genes in search for reproduction. They strive for rational, culturally bound purposes as well. Their childrearing aims, for example, could compensate for the detrimental side effects of maximization of inclusive fitness, and lead to more sensitive responses to the child's signals. On the contrary, these culturally approved aims could also lead to less responsive parental behavior, because caregivers aim at the child's autonomy and individualization at an early stage (cf. Grossmann, Grossmann, Spangler, Suess & Unzner, 1985). The evolutionary approach does not seem to take into account affective investments of other caregivers, c.q. adoptive parents. Adoption is a strongly culture-bound phenomenon, for which no ready biological explanation is available.

However, evolutionary models correctly show the necessity to consider attachment as partly based upon a species - specific genetic infrastructure, which certainly explains the almost universal status of attachment behavior, robust against many contextual variations (see next paragraph).

Control-system theory and attachment

In this light, the development of attachment behavior can be more adequately described with the aid of control-system concepts than with conditioning ones. Bowlby compared the organization of children's behavior to a control-system which can function, as it were, in a goal-corrected fashion through a feedback mechanism. The "programmed set-goal" of attachment behavior is maintaining contact with and proximity to the caregiver, or, from an internal psychological perspective: maximization of felt security (Sroufe & Waters, 1977; Bretherton, 1985). Behavior initiated to realize the set-goal is flexible and adaptable to specific circumstances. A child that cannot yet crawl or walk is more inclined to display passive attachment behavior of a demonstrative nature (crying), while a somewhat older child will try to make use of active attachment behavior (following). Still older children, with insight into the planning of parental behavior, will build this into their own planning of attachment behavior, and bear in mind shifts in their target-object: a goal-corrected relationship develops. In this connection it is not possible to speak of "reinforcement" or "extinction" of behavioral patterns, but of "activation" and "termination". The control-system is activated by the information that the "set-goal" has not yet been realized (the baby cries if the caregiver is not audibly or visually in proximity), unless other goals contrary to the attachment goal interfere (if the baby is involved in play or exploration it will not cry under these circumstances). The control-system is terminated when the "set-goal" has been achieved (the caregiver picks up the crying child, achieving the greatest possible proximity; but see Hubbard & Van IJzendoorn, chapter 9, this volume).

The control-system interpretation proved to be decisive for the success of the attachment research program. Waters (1978) referred to this interpretation in describing his research on stability of attachment. Attachment behaviors did not appear to remain the same over a half year period. Only patterns of attachment - the classification into A, B, and C categories - showed rather high stability. During the seventies, quite a few researchers thought attachment to be a construct that could not be measured reliably, because attachment behaviors seemed to change too much over time and situations. But in showing that attachment as a goal-corrected system did have the same quality in different settings and over time, criticism could be answered (see Lamb et al., 1985). Below, research on the stability of attachment will be discussed more extensively, but we hope to have made clear that Bowlby's theoretical foundation of the research program did have factual consequences for the way in which data were collected and interpreted. In this sense, attachment theory indeed constitutes a Lakatosian research program.

ATTACHMENT THEORY AND PHILOSOPHY OF SCIENCE: ATTACHMENT NETWORK AS PROGRESSIVE PROBLEM SHIFT

Research program

Without giving a complete definition of the concept of "research program", two characteristics appear decisive. Firstly, a group of researchers shares a hard core of premises, that remains accepted without discussion. Research is directed toward implications of the hard core. In the case of attachment theory, its hard core appears to consist of the phylogenetic foundations of attachment behavior. At first sight, it seems improbable that phylogenesis is relevant in explaining actual interactions between infant and caregiver. For attachment theory, however, the evolutionary point of view is indispensable in explaining some apparently anomalous facts, e.g., the instability of attachment behaviors.

Secondly, a research program can be characterized by its exemplary ways of solving problems. A research program has to contain guide-lines concerning acceptable operationalization of central concepts. These guide-lines fulfil an essential function in initiating and training young researchers, and in communication with the "invisible college" about the latest research results. The comparability of these results is, of course, guaranteed through the use of identical operationalizations. In the case of attachment theory, the widely used instrument to measure the central concept of attachment is the Strange Situation procedure. Attachment research can usually be identified by the application of this procedure to measure the main independent or criterium-variable. Hypotheses about the relationships between attachment and a host of other characteristics of caregiver-child interactions are tested with the Strange Situation.

One of the advantages of interpreting attachment theory as a research program consists of its comparability with natural science programs. Without denying differences between the natural and behavioral sciences, one could still learn from the way in which natural science programs develop progressively towards more insight into the phenomenon studied. Philosophers of science, e.g., Kuhn (1962) and Lakatos (1980), described globally the dynamics of research programs in the natural sciences, and for example, De Mey (1983) tried to work out its details using bibliometric methods. Through interpreting attachment theory as a research program its development can be better described and predicted. Actual controversies and discussions can be placed in a comparative and historical context. Therefore, more insight can be gained into the philosophical dimension of seemingly trivial but heated discussions, for example about the stability of Strange Situation outcomes.

Stages in the development of attachment theory

Simplified, four stages in the development of research programs can be discerned: "formulation", "construction", "saturation", and "exhaustion" (De Mey, 1983). These stages can be described at different levels of the scientific enterprise. Firstly, of course, on the level of content, but also on the methodological and organizational level. We would like to add a fourth level, namely practice. In Table 1, the different stages and levels are described.

Table 1
Stages in the development of research programs

	Stages			
Levels	Stage 1 Formulation	Stage 2 Construction	Stage 3 Saturation	Stage 4 Exhaustion
Content	Global description of paradigm	"Normal" science: theoretical application	Decrease of results; anomalies	Cumulation of anomalies; rise of competing programs
Methodology	Programmatical	Verification	Consistency	Apologetical
Communication	(Almost) absent	Informal (papers & symposia)	Formal (societies; conferences; journals)	Rigid (institutes; handbooks)
Practice	Heuristics (practice ↔ theory)	Source of data (practice → theory)	Application (practice ← theory)	Integration (practice ≡ theory)

Note. Table 1 is derived from De Mey (1983) who gives somewhat more information about "communication", but disregards the relationship between practice and theory

The four stages have to be considered as hypothetical. They are only partly based on data from the history and sociology of science. But it appears to be fruitful to use the model as a heuristic device in describing the development of attachment theory. It is clear that the attachment research program has been stuck in stage 1 for a long time. In fact, Bowlby and Ainsworth had to do their speculative and theoretical work for some twenty years before achieving a break-through. This stage was completed with the publication of Bowlby's "Attachment" (1969; 1971^{2}), in which he gave a synopsis of programmatic premises and presented some tentative empirical illustrations based on secondary material and clinical casus descriptions.

The practice of bringing up children in orphanages during and after the Second World War was his main source of inspiration, as we showed in the first paragraph.

During the sixties, Ainsworth and Wittig (1969) developed the Strange Situation procedure to study caregiver-child interactions under standardized stressful circumstances. They needed this kind of laboratory data to calibrate their home observations. Through the exemplary procedure for measurement of attachment much time-consuming and rather unstructured field works (Schaffer & Emerson, 1964; Ainsworth, 1967) could be replaced or complemented by a more efficient and current method of collecting data. Young scientists could rather easily learn to participate in attachment research through training in the application of the Strange Situation procedure. A period of "normal science" (Kuhn, 1962) begins, in which the network of variables around the central construct "attachment" is explored. An "invisible college" (Crane) of enthusiastic attachment researchers is being established. Intensive cooperation between Main, Bell, Waters, Stayton, Sroufe, Bretherton, Blehar, Wall and others leads to the merging of data files, which form the empirical foundation of the well-known "Patterns of attachment" (1978). The practice of preschool and family education serves in this stage only as a supplier of data to construct and amend the theory.

For that matter, we think the availability of the Strange Situation of more importance for the popularity of the attachment theory than its so-called ideological function. It has been stated that the attachment theory would fit nicely into existing family and motherhood ideology, and represent a confirmation of the supposed biologically based division of tasks and roles between men and women in family and society (Marris, 1982). The maternal deprivation theory of the young Bowlby was, in fact, already extremely popular shortly after the Second World War, in practice as well as in policy. The several editions of Bowlby's report on "Maternal care " (1951) to the World Health Organization illustrate this thesis well. But during the two decades after publication of this famous report, attachment research was only done on a very modest scale, if one compares this "latency" period to the "boom" in the seventies. In the process of "normalizing" the attachment theory, a supposed fruitful ideological climate did not appear to have enough weight. We assume that an internal scientific development - the construction of the Strange Situation - succeeded in turning the scale more effectively.

In the first half of the eighties, some symptoms of the saturation stage are notable. Superficially, attachment theory is prospering as never before. Almost every conference on early childhood education and development contains some explicit attention to results of attachment research. A few journals appear to be nearly domain specific (e.g., "Infant Behavior and Development"). Regularly, collections of articles on attachment are being published, and the first handbook for (future) researchers can already be purchased (Lamb et al., 1985). The methodological orientation is striving toward consistence. The theory is amended with hypotheses to adapt it to inconsistent empirical evidence. The debate on the cross-cultural validity of attachment theory (next paragraph) is an example, as well as the discussions on the temporal stability of attachment. Theoretically, attachment should be stable over time and context, because it has been defined as a relatively durable bond. But quite a few research projects did show instability in the development of attachment during the second year of life. This problem is sometimes methodologically "solved" by blaming the research procedure or the researcher; recently, a more satisfying explanation is offered by complementing the stability thesis with the condition of contextual stability. Quality of attachment can change over relatively short periods (e.g. six months) if radical changes in the caregiving arrangement occur. One expects a stable attachment relationship only in a relatively stable environment (Waters, 1983).

The battle against such inconsistencies requires quite a lot of energy; therefore, the productivity of the program falls somewhat behind the expectations. But a series of applications of the theory are becoming visible in this stage. The theory is applied in the practice of psychotherapy, parent education, in the prevention of developmental problems, and in the discussions on adequate caring of the young child outside the family, for example, in day nurseries or through child minders (see chapters 3 and 4). Attachment theory, however, is not yet fully integrated into common sense ideas about caregiving and into state policy on early childhood education.

Phylogenesis as hard core: cross-cultural research from Vygotskian perspectives

Above, the hard core of the attachment research program has been described. One of its aspects is the phylogenetic foundation of attachment behavior. The evolution of the human species is of great importance for understanding actual attachment behavior in infants. From this premise, attachment theory can claim a universal status. Culturally different groups all participated in the same phylogenesis, which is therefore decisive for the existence of attachment behavior in (almost) every member of the species, c.q. group. Cross-cultural research can provide data to test this claim, because this research can show differences and (universal) similarities of child development in different cultures (Van IJzendoorn, 1986).

Research in Sweden, Japan, West-Germany, Israel, and The Netherlands showed, however, that attachment does not develop in a uniform way across all cultures. Cross-cultural differences in distributions of children among attachment categories have raised the question whether the A (anxious-avoidant), B (secure), and C (anxious-resistant) classification represents alternative but equivalent pathways to maturity (Lamb, Thompson, Gardner, Charnov, & Estes, 1984). The percentage securely and anxiously attached children in different American samples is about 70% and 30% respectively. The American distributions lead to the supposition that the modal B-category represented the optimal or normative pathway; the A- and C-category were considered as deviant patterns (Ainsworth et al., 1978; Sagi & Lewkowicz, chapter 11 in this volume). However, this criterion does not appear to be valid in all cultures. In Japan, where parents almost never leave their infants alone, a high percentage of anxious-resistant children has been found (Miyake, 1984). In West-Germany, especially in the north (Bielefeld), a very high percentage of anxious-avoidant children has been found. Parents from this region seem to prefer early autonomy for their infants, and treat them accordingly (Grossmann, Grossmann, Huber & Wartner, 1981). In Israeli Kibbutzim, a great number of anxious-resistant children have been registered (Sagi, Lamb, Lewkowicz, Shoham, Dvir, & Estes, 1985; see also chapter 11 in this volume). In the Netherlands, the percentage of anxious-dependent children (B4) is rather high (Van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1984; see Goossens, chapter 4, this volume). Do these results imply a falsification of the claim of universality, and therefore constitute a fatal anomaly to the hard core of the program? To answer this question we have to present three main currents in cross-cultural research (Cole & Scribner, 1974; Van IJzendoorn, 1986).

First, there is a relativistic approach, in which it is presupposed that different cultures lead to large differences in psychological adaptation (Lévy-Bruhl, 1966). How cross-cultural differences in psychological functioning came into being is explained in several ways. Evolutionists (at present sociobiologists in particular) emphasize genetic differences between populations, which evolved in different ecological niches. Genetic factors could play an important role in culturally bound differences in neuroticism, dominance, depression and schizophrenia (Wilson, 1976). Besides this evolutionist explanation, the cause of cross-cultural differences is sometimes found in sociological and psychological factors.

Cultures demand different levels of competence of their members, and in socializing the individuals, an attempt is made to develop culturally functional characteristics and capacities. Different cultures provide their younger generations with different adaptive tools, including symbolic systems such as language. If there are great cross-cultural differences in the perception of colors, these can be traced to differences in sign systems for designating colors. Such differences in sign systems can again be traced back to the different sociological functions of color perception in different cultures. In attachment research, this approach would lead to great doubts about the universal applicability of the concept of attachment, and of the Strange Situation as its measurement procedure. Each culture has its own mode of caregiver-child interaction, and a uniform description of the relationship between caregiver and child through a uniform procedure would inevitably do injustice to specific culture-bound idiosyncrasies. Lamb et al. (1984) seem to prefer this perspective.

Secondly, there is a universalistic current (Lévi-Strauss, 1966) in which cross-cultural differences are not denied but are regarded as an unimportant veneer covering substantial similarities. Different uses of language, for example, can be traced back to the same underlying structure or competency. It is conceded that great differences in the content of abstract thinking exist, but every human being is capable of thinking abstractly in certain ways to communicate with his fellow human beings. In this current, it is supposed that all languages have the same fundamental structure, and that all children are born with a "language acquisition device" which helps them to learn their specific language in relatively short time (Chomsky). In attachment research, this universalistic approach leads to the claim that attachment develops in the same way and with the same structural characteristics (e.g., separation anxiety), despite notable differences in superficial aspects (e.g., nature and amount of physical contact). In fact, Bowlby (1971) and Ainsworth et al. (1978) take this point of view by situating the origin of a genetic "bias" for attachment in the more or less universal environment of evolutionary adaptedness and by regarding the cristallization period of different cultures as too short a time to lead to substantial differences in genetic equipment. Even now, babies are assumed to attach themselves to a protecting adult because they too fear the age-old and universal dangers of darkness, sudden attack, loud noises, etcetera. If there are any cultural differences in attachment, these would only concern some superficial characteristics.

Thirdly, there is the cultural-historical approach, inspired by Vygotskij (1962) and Lurija (1979). This Soviet-Russian approach, which strongly influenced such American psychologists as Bronfenbrenner (1979), Bruner (1983), Cole and Scribner (1974), and Wertsch (1985), tries to synthesize the relativistic and universalistic points of view. The distinction between the lower and higher psychological processes is fundamental to this approach. The lower psychological processes, such as eidetic memory, are considered to belong to the basic evolutionary equipment of every human being. The higher psychological processes, such as logical reasoning, however, developed quite late in phylogenesis. Mediation through language or other sign systems is characteristic of these higher processes. Because different cultures provide their members with largely differing sign systems, large cross-cultural differences in higher psychological processes may be expected. From a cultural-historical perspective, the universal characteristics of the lower psychological processes are combined with the great cultural variation of the higher processes.

The question, then, is whether attachment should be regarded as the outcome of lower or higher psychological processes. Because Vygotskij himself related the distinction between higher and lower processes largely to the development of communication through language, in his view attachment would be the product of lower psychological processes and, therefore, have a universal nature. Elsewhere, we criticized Vygotskij for his neglect of other sign systems than language, and we referred to the subtle nonverbal sign system through which caregivers and babies communicate (Van der Veer, & Van IJzendoorn, 1985). Against this background it seems unjustified to consider attachment as the expression of lower psychological processes. We feel justified in assuming that such attachment behaviors as proximity-seeking, crying, and maintaining contact are indeed the outcome of universally "programmed" lower psychological processes. Patterns of attachment, however, are the expression of nonverbally mediated higher processes that could be strongly culture-bound. The same patterns of attachment could in different cultures fulfil different functions in the transaction between the child and its environment, but the lower processes that underlie these patterns are part of the genetically determined "equipment" of every human being.

From this Vygotskian perspective, it is therefore admissible to search for universal attachment behaviors, and its development in different cultures in the first years of a child's life with a uniform measurement procedure such as the Strange Situation. "Deviant" patterns of attachment, however, have to be interpreted against the background of cultural differences. Every culture will have its own functional (and perhaps modal) pattern which may deviate more or less from the American "standard". We hypothesize, for instance, that in the Netherlands the modal B1-category is more adaptive than its American counterpart, the B3-category. In the Netherlands, - as in Germany (see Grossmann & Escher-Graub, 1984) - much stress is laid upon the child's learning to fend for itself, and parents are afraid of spoiling the child at an early age with too much attention and explicit signs of love.

In short, from a Vygotskian perspective one has to look not only for heterotypical continuity of adaptation across age and situation (Sroufe, 1979), but across cultures as well. The same functional optimum could, then, be shown to be reached along different lines or patterns of attachment. Provided the classification is not normatively interpreted a priori, the Strange Situation procedure could play an important role in cross-cultural research, as it taps the universal dimension of attachment behavior as outcome of lower psychological processes.

In this way, universalistic and relativistic perspectives are integrated. The Vygotskian interpretation of cross-cultural differences in attachment distributions protects the hard core of the research program against the fatal influence of an inexplicable anomaly. From a cultural-historical perspective, one of the most important obstables for the development of the attachment research program disappears; that is, the supposed cross-cultural invalidity of universalistic aspects of its hard core.

Attachment network as a progressive problem shift

Because Lakatosian research programs have to be considered as a series of successive theories with approximately the same hard core of premises, concepts and instruments, but with continually changing ad hoc hypotheses and observational theories (consisting of the "protective belt" preventing the hard core from being empirically refuted), the question arises how a research program can change and progress towards a better understanding of reality. In which way can a research program be said to make progress, i.e., which criteria have to be met to speak of so-called "progressive problem shifts"? The traditional positivistic answer to this question was rather simple: empirical evidence would tip the balance. Recent developments in the philosophy of science, however, make clear that the relation between data and theory, c.q. research programs, has become much more complicated than verificationism and falsificationism suggested in the past (Van IJzendoorn & Van der Veer, 1984). According to verificationism, a researcher has the relatively simple task to collect as much confirming empirical evidence in favor of the hypothesis as is possible. Falsificationism prescribes deriving bold hypotheses from a theory, and to test these potentially refutable hypotheses severely. These approaches, however, can be shown to incorrectly mirror successful scientific projects. For example, it has been shown that data are always theory-laden, and therefore the so-called "hard facts" may be refuted in the same way as theories are falsified. We do not have hard facts available to detect the soft spots in our theories. Besides, in the history of science it has been discovered that successful research programs were nevertheless surrounded by a great number of "refuting" facts, or anomalies. These anomalies did not appear to block the progress of the research program, and certainly did not (immediately) lead to abandoning the program's hard core. Recently, the dynamics of the scientific enterprise are not sought in the stressful relation between theories and data, but in the structure and competition between theories (including the observational theories) for survival and dominance. Empirical evidence is only important in indicating theoretical inconsistencies leading to revision or refutation of one of the relevant theories in the series constituting the program's protecting belt. When, where and how these revisions are to be made, is a complex question. Lakatos formulated four criteria that should be used in judging problem shifts as progressive or degenerative. He derived these criteria from his historical studies of famous natural science programs (Lakatos, 1980).

1. Revisions should only be made in the "protective belt" and not in the hard core constituting the identity of the program (this is called the "negative heuristic");
2. Revisions do not lead to less internal consistency of the program, but should follow "logically" from developments in the past (this is the requirement of internal consistency, to which Laudan's requirement of conceptual clarity could easily be added, see Laudan, 1984; Gholson & Barker, 1985);
3. Revisions should not be "ad hoc", but must increase the content of the theory, that is, it should predict "new facts" (this is called the requirement of theoretical progress);
4. Theoretical progress should be confirmed by empirical evidence from time to time; that is, predictions about new facts should indeed be verified now and then (the requirement of empirical progress).

The role of the four criteria in revising a research program can be illustrated with the thesis of Bowlby that children attach primarily to one caregiver, usually the mother. This is the so-called monotropy-thesis. Applying the four criteria to test the "progressiveness" of this problem shift, we get the following results. In adding the monotropy-thesis to the attachment theory, Bowlby appears to break the rule not to make changes in the hard core of the program without its being tested seriously. The monotropy-thesis implies a hierarchy of attachment relationships, in which the bond with the "primary" caregiver is the strongest, other relationships functioning at a lower level of intensity. Speaking in terms of "strength" of a bond implies crossing over to another research program. In attachment theory one can only speak about quality of attachment - the exemplary operationalization only measures quality, not strength of the relationship. "Strength" of a bond typically belongs to the terminology of the conditioning approach to attachment (Gewirtz, 1972), in which the difference between attachment and dependency seems to be blurred (Ainsworth, 1969; Sroufe, 1985). In a conditioning context, it is perfectly correct to argue about the strength of the dependency of an infant on its parent. But without losing sight of the fundamental difference between attachment and dependency, it is not possible to argue about a hierarchy of attachment figures with stronger or weaker bonds with the child. Furthermore, the monotropy-thesis did not lead to empirical progress. On the contrary, the thesis is not confirmed by empirical evidence pointing to the existence of equivalent attachment relationships with several different caregivers, e.g. father, mother, and professional caregivers (Lamb, 1978; Main & Weston, 1981; Sagi et al., 1985; Smith, 1980; Smith & Noble, chapter 3 in this volume). The attachment relationships do not have identical qualities and thus appear to be dyadic-specific, but they cannot be discerned in terms of strength, and be placed in a hierarchy.

The hard core of attachment theory, rather, appears to imply a revision in an opposite direction. One of the theory's main characteristics is that development of an attachment relationship was disconnected from the idea of parental satisfaction of the child's primary - physical - needs. One of the premises of attachment research program emphasized the feelings of security a child may derive from the (psychological or physical) presence of a protective adult. In that case, the child should be "able" to attach itself to more than one caregiver, inside as well as outside the group of adults who care for its physical well-being. Having an attachment relationship with several different persons - within limits set by restricted cognitive capacities - has the advantage that relationships of an anxious quality may be compensated by relationships of the secure type. Separation from one attachment figure may neither lead to anxious feelings if another attachment figure stays behind with the child. Therefore, we would like to replace the monotropy-thesis with the "extension hypothesis". This hypothesis suggests that an optimal caregiving arrangement consists of a network of more or less stable attachment relationships between the child and several different caregivers. It should be noted that a network only consisting of secure attachments is, of course, preferable to a network with one or more anxious relationships (see Tavecchio & Van IJzendoorn, chapter 2 in this volume for further details on the hypothesis).

Revising the attachment theory through adding the "extension hypothesis" means making a progressive problem shift. The revision implies independently testable predictions about phenomena not yet studied in depth. We mentioned, for example, the prediction that a child may have attachment relationships of different quality, and that the detrimental effects of an anxious attachment may be compensated by secure attachments with other figures. Recent research has made clear that the first part of this prediction is correct. Therefore, theoretical as well as empirical progress has been shown to be the consequence of the introduction of the "extension hypothesis".

CONCLUSIONS

In this chapter, we have tried to describe the development of attachment theory as a research program. After briefly sketching the historical background of the rise of attachment theory, we outlined the main features of the program. It was argued that the hard core of the program consists of the phylogenetic premises and the instrument to operationalize the core construct, namely attachment quality. The stages of formulation, construction and saturation in the career of attachment theory were illustrated. We concluded that a few anomalies might block further development of attachment theory. Firstly, the problem of the stability of attachment does not appear to have been solved definitely. It is not clear how "resistant" to change attachment quality is, under changing caregiving arrangements. Secondly, cross-cultural research results indicate that attachment quality is not distributed in the same way in all cultures. This culture-bound characteristic of attachment is a challenge to the supposed universal occurrence of attachment. We suggested that a Vygotskian perspective on this matter could show a way out of the problem. Lastly, we showed that Bowlby's thesis of monotropy and hierarchy of attachment relationships has to be considered as a "degenerative problem shift". We proposed to replace the monotropy-thesis with the "extension hypothesis": the optimal caregiving arrangement would consist of a network of stable and secure attachment relationships between the child and both its parents and other persons such as professional caregivers, members of the family, or friends. In research, attachment should be considered in light of a network of relationships the child builds up in the first years of life.

Note:

This chapter is partly based on previous publications which include the following:

- Van IJzendoorn, M.H. (1983). ***Van wijsgerige naar theoretische pedagogiek*** [On philosophy and theory of education]. Deventer: Van Loghum Slaterus.
- Van IJzendoorn, M.H. (1985). De gehechtheidstheorie. Over de levensloop van een onderzoekprogramma voor vroegkinderlijke opvoeding en ontwikkeling [Attachment theory. On the development of a research program]. In J. de Wit, J.H. Groenendaal & J.M. van Meel (Eds.). ***Psychologen over het kind*** *8*. (pp.55-78) [Psychologists and the child]. Lisse: Swets & Zeitlinger.
- Van IJzendoorn, M.H. (1986). The cross-cultural validity of the Strange Situation from a Vygotskian perspective. ***The*** *Behavioral and Brain Sciences, 9*.
- Van IJzendoorn, M.H., Tavecchio, L.W.C., Goossens, F.A., & Vergeer, M.M. (1985^2). ***Opvoeden in geborgenheid. Een kritische analyse van Bowlby's attachment theorie*** [Growing up secure. A critical analysis of Bowlby's attachment theory]. Deventer: Van Loghum Slaterus.

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Part Two

EXTENSION OUTSIDE THE FAMILY: A LARGE-SCALE APPROACH

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ATTACHMENT IN SOCIAL NETWORKS
L.W.C. Tavecchio and M.H. van IJzendoorn (editors)
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CHAPTER 2

PERCEIVED SECURITY AND EXTENSION OF THE CHILD'S REARING CONTEXT: A PARENT-REPORT APPROACH[1]

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ABSTRACT

It is argued here that Bowlby's monotropy thesis is theoretically and empirically untenable, and should be replaced by our "extension hypothesis", which states that an optimal child-rearing context is formed by a *network* of more or less stable attachment relationships between the child and its caregivers. The "Perceived Security" scale is then introduced, a parent-report measure purporting to assess one aspect of the multi-dimensional attachment construct, that is, the degree to which the child feels secure in the more or less strange, potentially threatening situations it is likely to encounter in everyday life. After describing two validational studies with this Perceived Security scale (relating its score to Strange Situation classification results and data on the children's Temperament, respectively), two studies relating the children's Perceived Security to a number of operationalized aspects of the "extension hypothesis" are discussed. Both studies support this hypothesis in that their results suggest that an extension of the children's rearing context (both quantitatively and qualitatively) is associated with a higher degree of Perceived Security.

INTRODUCTION

The work of Bowlby is characterized by a relatively strong neglect of the influence of child-rearing practices on the development of attachment, what may be described as its "pedago-

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gical" dimension. Although Bowlby does not question the important role played by caregivers in the development of attachment, he has devoted far more attention to the (unamenable) ethological roots of attachment than to its potentially controllable "pedagogical" determinants. Yet, at various places in his oeuvre one can find interesting comments on the effects of these determinants.

It is our objective to put these comments together and, if necessary, to criticize them. In this connection we will pay special attention to Bowlby's so-called "monotropy thesis", which will be replaced by our "extension hypothesis". In this hypothesis, we will emphasize the positive effects of an extension of the child's rearing context on the development of (secure) attachment.

The dynamic equilibrium between caregiver and child: attachment, exploration, and stability

Bowlby looks upon the structure of the early child-rearing context as a dynamic equilibrium between reciprocal and antithetical behavioral patterns of caregiver and child (Bowlby, 1971, p.288). On the one hand, the child's behavior is characterized by a tendency towards being in the proximity of a protecting conspecific ("proximity seeking"). On the other hand, it is characterized by the irrepressible urge to explore the environment ("exploration"). Between these two basic behavioral patterns (which Bowlby puts on the same level as the need for nutrition) there is a subtle equilibrium: the "unknown" is often alarming (thus evoking a stimulus to proximity seeking) as well as cause for curiosity (eliciting an impetus to exploration), all at the same time. Dependent upon the situational context, the balance either shifts in the direction of proximity seeking (when a familiar attachment figure is not available) or in the direction of exploration (when there is a protecting conspecific supplying a secure exploration base).

The caregivers' behavior, too, is characterized by two possibly antithetical tendencies. On the one hand, they feel called upon to establish a relationship with the child that confirms their position as a familiar and protecting conspecific ("interaction"). In addition, due to the compelling nature of the child's proximity-seeking behavior (such as crying or clinging), caregivers will reluctantly shirk their duty to act as an attachment figure. On the other hand, though, caregivers have to pay attention to other aspects of family life (e.g., the rearing of other children, their relationship with the partner, household chores, etc.), and to societal demands (such as work, education, and leisure interests). This last category of activities (briefly defined as "work") may well prove to be incompatible with "interaction" activities.

In such a dynamic and fragile equilibrium, conflicts seem difficult to avoid. The question is, which disturbances of the equilibrium exert a negative influence on the child's development, and how they can be counterbalanced. Of crucial importance to maintaining the equilibrium is the process of "matching" the child's proximity-seeking behavior to the caregiver's "interaction" behavior. Caregiver and child will have to get attuned to each other in such a way that they learn to be perceptive of each other's signals. The caregiver should be able to decode the relatively undifferentiated behavior of the baby and the young child and be able to respond adequately, for example by cuddling and providing comfort. Stern (1977) has described this subtle attuning process in detail. A stable relationship with regularly recurring interaction episodes forms a condition which is necessary for the development of a harmonious "match" between both partners. Only within such a stable relationship is provision made for the establishment of the aforementioned attuning process. This could be described as Bowlby's "law of stability or continuity": "The more stable and predictable the régime, the more secure a child's attachment tends to be; the more discontinuous and unpredictable the régime, the more anxious his attachment" (Bowlby, 1975, p. 261). In the context of a stable relationship with regularly occurring interactions, the behavior of the interaction partners will become more and more predictable to each other. This attuning process takes time to develop; not only because of its subtle nature, but also due to the relatively underdeveloped interactive abilities of the child and its initial inability to form inner representations of the pattern of interaction. In our view, however, Bowlby's "law of stability" does not automatically imply that only one specific caregiver can form an attachment relationship with the child. In other words: stability does not imply monotropy, as we will demonstrate in the following sections.

Disturbances of the equilibrium: overprotection and neglect

Broadly speaking, the maintenance of the equilibrium is threatened by two tendencies that may occur to a greater or lesser degree. First, the caregiver might pay too much attention to "interaction" activities due to, for example, the absence of "work". In this case, "smothering" (Bowlby) or "overprotection" may develop, imposing care on the child in a coercive way. Such an over-anxious concern for the child results in an insufficient degree of exploratory behavior, and it is the cause of the child's fixation on the maintenance of proximity seeking to the caregiver. Secondly, the caregiver may feel forced into spending so much time on "work" activities (e.g., other children in the family, a job, etc.), that the interaction component lags behind. In that case, caregiver and child have little opportunity to attune to each other in a way that is satisfactory to both, and there is the looming danger of "neglect": the child experiences too many separations from its caregivers to remain confident in their accessibility in case of need.

We have just described these two disturbances of the equilibrium from a quantitative point of view, that is, in terms of too much or too little time and attention given to the child. Bowlby, however, repeatedly points to the more qualitative aspects of the interaction process between caregiver and child. On account of their own development and upbringing or due to societal factors, caregivers sometimes are unable to respond sensitively to the child, even though the amount of time spent with the child should in itself be sufficient for the establishment of a harmonious relationship. In addition, he refers to the frequently occurring phenomenon that caregivers, unintentionally or deliberately (by way of punishment), threaten the child with separation, for example by threatening to leave the home or to send the child away (cf. Bowlby, 1975, p.243). In Bowlby's view, such threats of sanctions may have as calamitous an effect on the development of attachment as real separations.

To summarize, in Bowlby's work one can find the following disturbances of the equilibrium which have negative effects on the development of attachment:

1. Physical inaccessibility of the caregiver (separation);
2. Emotional inaccessibility of the caregiver (lack of sensitivity);
3. Instable and unpredictable régimes (too many relationships of short duration with several different caregivers);
4. Threats with temporary or permanent inaccessibility (threats of sanctions in terms of separation and "love-withdrawal");
5. Inversion of the attachment relationship by an insecurely attached caregiver (this pertains especially to the older child being forced into playing the role of an attachment object);
6. Compulsive interaction on the part of the caregiver, which does not meet the child's needs ("compulsive care-giving" or "overprotection", cf. Bowlby, 1979, p.137).

In Bowlby's opinion, the most frequently occurring disturbances of the equilibrium are brought about by "neglect", that is, by too low a degree of interaction between caregiver and child, and by a lack of stability and sensitivity in this interaction. In his judgment, the child cannot actually be spoilt by too much attention on the part of the caregiver (by overindulgence or overprotection), provided that the child's needs regulate the amount of attention given. Overprotection develops as a result of the caregiver's compulsive need to give more attention than is wanted by the child. Bowlby, therefore, prefers the phrase "compulsive care-giving" to "overprotection" to underline that it is the caregiver and not the child who is the cause of the excessive amount of attention and care (Bowlby, 1971, p.422). A child cannot be spoilt if its own need for interaction determines the amount of attention it receives. Besides, according to Bowlby, children up to about three years old, who do not yet possess adequate cognitive abilities to form inner representations of the caregiver's availability, can only be confident as to the attachment figures' accessibility when they are actually present (Bowlby, 1975, p.237). Elsewhere he remarks on this matter: "...effects of separations from mother during the early years are cumulative and ... the safest dose is therefore a zero dose" (Bowlby, 1975, p.255). From this perspective, his sceptical attitude towards institutional care of children under the age of three years (for example in day care centers) can be understood. In his opinion, the danger of overprotection is very small (contrary to the view of, for example, Van den Berg, 1958), since children can hardly be spoilt by too much attention. Furthermore, he assumes that children at this early age can be contented only with the actual presence of their attachment figure, and, finally, that separation experiences are not "forgotten" but, on the contrary, have a cumulative effect. Thus, from Bowlby's point of view, the most plausible conclusion is that child-rearing contexts characterized by the permanent availability of one and the same caregiver lay the ideal foundation for the development of secure attachment relationships. We, however, are rather critical of this conclusion, and will go further into the matter in the next section.

Extension of the child-rearing context

Although Bowlby repeatedly points to the negative effects of temporary separations between child and caregiver, he makes, in our view, too little allowance for the fact that in the modern family (still the context in which most children are brought up), separations between caregiver and child are inevitable. In present-day society, permanent actual presence of the (primary) caregiver is virtually impossible in a family in which there is (often) more than one child to be cared for, and in which the caregiver has to fulfil other responsibilities than bringing up children. In most families, help provided by baby-sitters, neighbors, relatives (for example grandparents), friends, acquaintances and especially the partner is indispensable. Given the inevitability of temporary separations, the optimal rearing context will, from the child's perspective, be made up by more or less stable relationships with several different caregivers who all act as attachment figures. For if only one specific caregiver has developed into an attachment figure, each separation will appear to be a very severe event, since the child has no one else to turn to. On the other hand, in an extended rearing context, a separation from an attachment figure does not automatically imply a separation as perceived by the child: there are other caregivers who may provide the same source of security in potentially threatening situations. Moreover, forced permanent separations between caregiver and child (for example due to decease or divorce) can be endured better in an extended rearing context. In his most recent book, "Loss", Bowlby, basing himself on a multitude of clinical data, contends that a young child is capable of coping with the loss of an attachment figure when the following three conditions are met: (1) prior to the separation, a secure attachment relationship should exist; (2) young as the child may be, it should be informed promptly and accurately of the fatal event, and (3) there should be the comforting presence of its surviving parent or a known and trusted substitute as well as an assurance that the relationship will continue (Bowlby, 1980, p.276).

It is the last condition which is of particular importance in this respect. In a rearing context in which there is only one attachment figure interacting intensively with the child, an unexpected temporary or permanent separation can hardly be endured. On the other hand, in an extended rearing context, the continuity of the régime will be better ensured, and in the case of such a fatal event, this is exactly what the child needs most. Moreover, an extended rearing context may enrich the child's experiences: in a way, each attachment relationship is different as to its form and substance, and the child therefore is more likely to learn to attune its behavior in a subtle way to that of the interaction partner concerned. Add to this that certain peculiarities inherent to a particular caregiver-child relationship may be compensated for by the interaction with other caregivers. For instance, there are caregivers who are more strongly inclined to enter into distal rather than proximal interaction, in spite of the child's need for intensive physical contact. In an extended rearing context, this need is more likely to be fulfilled by other caregivers. Also the danger of "smothering", of too much involvement on the part of the caregiver with the child, is likely to decrease in such a context. An "overprotective" caregiver will be forced to "hand over" the child to others regularly, and in this way is likely to be corrected more readily.

Of course, the abovementioned positive effects of an extended rearing context hold only on condition that the necessary amount of stability is provided for, in spite of the greater number of attachment relationships. Consequently, in an extended rearing context each caregiver will have to interact quite frequently with the child in order to build up the "sensitive responsiveness" (Ainsworth) necessary for the development of a secure attachment relationship. From the child's perspective, regularity should guarantee the predictability of the situations it will encounter. It may therefore be expected that a sufficient amount of stability can also be realized in extended rearing contexts characterized by the presence of multiple attachments, provided that the degree of extension remains within certain limits. This last aspect will be discussed later.

Finally, an important advantage of an extended rearing context for the caregivers is that they can devote more time and attention to the "work" component, without fear of harming their attachment relationship with the child. For attachment research has made clear that, given a certain quantitative minimum of interaction time, the attachment relationship will be determined primarily by the *quality* of the interactions (cf. Van IJzendoorn, 1979). Moreover, in an extended rearing context the temporarily absent caregiver (for example the working mother) is assured that the child is being cared for by persons with whom it has developed a good attachment relationship. In such a context, the possibly negative effects, on rearing as well as "work" activities, of "feelings of guilt" on the part of employed mothers can be reduced to a minimum (cf. Goossens, 1986; see also Chapter 4 in this volume).

Therefore, our extension hypothesis is that negative disturbances of the equilibrium in the Bowlbyan model of early child-rearing described above, can be prevented effectively in an extended rearing context. Neither tendencies to neglect nor tendencies to "overprotect" are likely to become prominent in an extended context. The negative effects of temporary or permanent separations between caregiver and child can be resisted successfully and constructively, as there are other attachment figures who will provide security and trust. Thus, an extended rearing context does not necessarily imply instability and unpredictability for the child.

Monotropy and hierarchy as related to the extension hypothesis

The extension hypothesis we have just introduced is based on two assumptions: (1) increasing the number of attachment relationships (within certain limits, see the next section) does not have to bring about negative effects on the quality of these relationships, and (2) several different attachment relationships may all serve the same purpose of providing security in potentially threatening situations. In a way, however, Bowlby's monotropy-thesis seems to be in contradiction with these assumptions. This monotropy-thesis states that "... there is a strong bias for attachment behaviour to become directed mainly towards one particular person" (Bowlby, 1971, p.368). In addition to this thesis, Bowlby differentiates between "principal" and "subsidiary" attachment figures; the child allegedly places several persons with whom it forms an attachment relationship in a hierarchy, on top of which one finds just one attachment figure who, especially in extreme situations, will provide enough trust and security. The monotropy-thesis, then, should *not* be interpreted to mean that the child forms a "true" attachment relationship with just one particular caregiver (an interpretation still endorsed by Smith, 1980). Bowlby does admit the existence of multiple attachments. He denies, however, the fact that several different caregivers may play essentially the same role of attachment figure, and he constructs an explicit hierarchy of attachments. However, the concept of "hierarchy" implies that the bond with the "principal" attachment figure is the strongest one, and that the other relationships should be placed lower in the scale. Now, speaking of the "strength" or the "intensity" of a bond implies a change of paradigms (see Chapter 1 in this volume). For within the attachment paradigm, the crucial concept is that of the *quality* of attachment (to be assessed in Ainsworth's Strange Situation), whereas the concept of "strength of the bond" represents a category stemming from learning theory. Besides, the monotropy-thesis, i.e., the hierarchy of attachment relationships, is not consonant with various empirical findings which provide evidence that children may have similar attachment relationships with several different adults, i.e., father, mother, and professional caregivers (cf. Lamb, 1978; Main & Weston, 1981; Sagi, Lamb, Lewkowicz, Shoham, Dvir, & Estes, 1985).

Arguments for the existence of monotropy can also not be inferred from the phenomenon that a child may, in certain (stressful) situations, be inclined to take refuge with one of the attachment figures present; the child can make a choice, and this choice may be made for "casual" reasons (when there is a thunderstorm the child may be looking for its mother, for instance, because the mother feels more secure in such a situation - and therefore inspires more confidence - than the father). Only if in the mother's absence the child would not take refuge with the father (which it would have done in other, less alarming situations), is it possible to assume that there is a "subsidiary" attachment relationship with the father. Such findings, however, have not been reported and in such a case, they would appear to be quite counterintuitive. Experiences with young children, and the abovementioned empirical evidence as to the existence of (qualitatively) similar attachment relationships with several different adults, point in another direction. In our opinion, then, the monotropy thesis lacks empirical support and proves to be untenable. We therefore adhere to the extension hypothesis, which states that an optimal child-rearing context is formed by a *network* of more or less stable attachment relationships of the child with its caregivers.

Limits of extension

In our introduction of the extension hypothesis, it was emphasized as an essential condition that the extended rearing context should remain sufficiently stable and predictable for the child. It is not realistic to expect a one year-old child to enter into a large number of equivalent attachment relationships, considering the lengthy process of attuning between child and caregiver in each case. It is not easy to determine where the lines at extending the rearing context should be drawn, also in view of the fact that this might be very strongly dependent on the child's age, its cognitive abilities, etc.. Smith (1980, p.380) after reviewing cultural-anthropological literature relevant to this subject, came to the rather trite conclusion that "shared care amongst some 20 to 80 caretakers ... seemed to make it difficult for children to make attachment relationships ...". Results stemming from research into the role of the father in the development of attachment (cf. Vergeer & Van IJzendoorn, 1981; Lamb, 1976), and research into the influence of nurseries and day care centers on attachment (cf. Kagan, Kearsley, & Zelazo, 1978; Sagi et al., 1985; Goossens, 1987) suggest that at least three caregivers can form an attachment relationship with the child without difficulty. Future research into communal child-rearing practices might shed more light on the upper limit of extending the rearing context.

EMPIRICAL STUDIES WITHIN THE FRAMEWORK OF THE EXTENSION HYPOTHESIS: THE RELATION BETWEEN "DENSITY OF THE REARING CONTEXT" AND ATTACHMENT, I.E., PERCEIVED SECURITY

Since the early eighties, a number of empirical studies have been undertaken within the framework of the research project "Early Child-Rearing" at the University of Leiden, with a view to sharpening and testing the extension hypothesis. In a series of successive investigations (carried out between the end of 1979 and the end of 1982), an attempt was made to detect certain "attachment-relevant" behavioral characteristics of children's everyday life experiences, by using questionnaires sent to their caregivers. The focus was on one aspect of the multi-dimensional attachment construct, namely *the degree to which the child feels secure in the more or less strange, potentially threatening situations it is likely to encounter in everyday life.* The answers of the mothers to a number of questions concerning their child's behavior in these situations result in a summative score on the so-called "Perceived Security" scale (the specific content of which will be discussed in later sections). These "perceived security" scores have been related to a number of variables, each of which can be regarded as an operationalization of certain aspects of the extension hypothesis. They include the following:

- working status of the mother ("maternal employment"): is she a full-time homemaker or does she have a full-time or part-time job?
- non-parental care of the child: does the child attend a nursery or day care center; the frequency and duration of non-parental care, not only in institutional settings, but also child care provided by neighbors, relatives (grandparents), baby-sitters, etc.;
- the number of (short) separations, for example, the number of times the child stayed at a friend's or relative's house ("overnight separations");
- the division of tasks and responsibilities between the spouses, particularly the role of the father in extending the rearing context;
- maternal involvement with the child, a measure varying between the two poles of (anxious) overconcern ("Overprotection") and a more distant or relativistic attitude towards child-rearing (which only in its most extreme form might develop into "neglect").

In this way, various aspects of what we define as the "density of the rearing context", i.e., measures for quantitative (e.g., "maternal employment", "non-parental care") as well as qualitative (e.g., "maternal involvement with child-rearing") modifications of this context have been related to perceived security scores.

The empirical studies to be reported on in the following sections are successively[2]:

- Two validational studies with respect to the Perceived Security scale. In the first study Perceived Security scores have been related to Strange Situation classification data; in this chapter only a summary will be given, as a more detailed account was presented elsewhere. In the second study, to be described in more detail, Perceived Security scores were related to a parent-report measure of temperament ("Perceived Temperament"). The goal was to determine the discriminant validity of these two scales, both designed to measure important early childhood constructs.
- Following these validational studies, we will discuss the results of several studies based on the extension hypothesis which were conducted to find correlates of Perceived Security with the abovementioned operationalized aspects of this hypothesis.
- At the end of this chapter a tentative synthesis of the results of these last studies will be presented.

THE "STRANGE SITUATION" AND "PERCEIVED SECURITY" COMPARED: A SUMMARY OF A FIRST VALIDATIONAL STUDY

In this section we will summarize briefly the results of this study, in which Perceived Security scores were related to Strange Situation classification results. A complete description is given by Van IJzendoorn, Tavecchio, Goossens, Vergeer and Swaan (1983). It was found that children belonging to Ainsworth's B4 and C (sub)groups were perceived as considerably "less secure" (i.e., they scored lower on the Perceived Security scale) in stressful everyday life situations than both the A children and the B1-B3 children, who seemed to be indistinguishable with respect to their "Perceived Security" scores. In attempting to answer the question which aspects of the Strange Situation procedure correspond most with the Perceived Security score, two multiple regressions were computed, with the scores on four interactive scales (i.e., "proximity seeking", "contact seeking", "maintenance of contact", and "resistance") in the two reunion episodes (5 and 8) as "predictors", the children's Perceived Security score serving as dependent variable. For Episode 5, interactive scale scores explained about 21% of the variance in Perceived Security. Interactive behavior in the most stressful reunion Episode 8 explained only 10%. This episode did not seem to elicit the same behavior in children as is perceived in potentially threatening, daily life situations. In Episode 5, less intense proximity seeking and contact maintaining seemed to correlate with greater security as perceived by the mothers. Resistant and avoidant behavior hardly seemed to explain any variance in Perceived Security (cf. Van IJzendoorn et al., 1983, pp.688-689).

In this first validational study, then, indications were found for the ecological validity of the Strange Situation. This originally American procedure appeared not only to produce reliable results in the Dutch context but also to elicit behavior in children comparable to their behavior in corresponding everyday, possibly stressful situations. Although the Strange Situation only allows for a relatively short period for the observation of behavior in unfamiliar surroundings (cf. Bronfenbrenner, 1979, p.19), mothers appear to make similar observations during their frequent and intensive contact with the child in many different everyday situations. Mothers perceive the same fear, sorrow, and other feelings of restlessness among their B4- and C-children as might be expected on the basis of their behavior in the Strange Situation. In Episode 5 in particular, children showed interactive behavior that corresponds with their Perceived Security score. The most threatening Episode 8 seems more atypical in this respect. However, mothers did not appear capable of expressing on the Perceived Security scale the more subtle indicators of an avoidant attachment. The scale makes no distinction between seemingly undisturbed and unruffled behavior as displayed by the ("avoidantly attached") A children in stressful situations, and behavior which demonstrates trust in the accessibility of the attachment figure as displayed by the ("securely attached") B1-B3 children in these situations. It is possible that this is due in part to the limited sensitivity mothers of A children display for signals from the child (Ainsworth, Blehar, Waters, & Wall, 1978, p.300).

Further research with the Perceived Security scale should be done to find out whether attachment measures based on a parental report can be improved to the extent that they will also reflect more subtle and unspectacular behavioral characteristics of the child (cf. Waters & Deane, 1985).

DISCRIMINANT VALIDITY OF SCALES FOR PERCEIVED TEMPERAMENT AND PERCEIVED SECURITY: A SECOND VALIDATIONAL STUDY

Along with attachment, temperament belongs to the most widely studied constructs in infant and early childhood research, and this situation might well continue for many years to come. Regarding temperament, most researchers agree today that individual differences in this characteristic refer to relatively enduring aspects of behavioral style that have some constitutional basis (cf. Goldsmith & Campos, 1982). Because of the omnipresent and pervasive influence of such stylistic differences in behavior, early childhood research has increasingly more set itself to answering the question whether temperamental differences affect the development of attachment and influence the assessment of attachment quality in the Strange Situation. Attachment theorists, however, have tended to minimize the direct role played by endogeneous characteristics such as temperament in the development of individual differences in infant-parent attachment. Although these theorists acknowledge that infants are born with distinct behavioral styles, they propose that it is the mother's *accommodation* to these characteristics during the first year which determines individual differences in the interactive quality of the mother-child dyad, and, consequently, individual differences in the quality of attachment as assessed on the basis of the child's behavior in the Strange Situation.

Without going in detail into the discussion on the relation between temperament and attachment (cf. Goldsmith & Campos, 1982; Waters & Deane, 1982), we draw attention to the fact that there exist widely divergent views on this subject. For instance, Kagan (1982) argues that temperamental differences rather than differences in maternal behavior are the major sources of individual differences in Strange Situation behavior; differences among "avoidant", "ambivalent", and "securely" attached infants may not reflect a history of mother-infant interaction, but rather individual differences in susceptibility to stress - any stress, not just temporary loss of the mother. At the other extreme, Sroufe and Waters (1982) maintain that temperament and attachment are essentially *orthogonal* dimensions: securely attached infants may have vastly different temperaments, as may anxiously attached infants.

In reviewing the available evidence concerning the relationship between temperament and attachment quality (as assessed in the Strange Situation), Lamb, Thompson, Gardner, and Charnov (1985) state that variations in temperament as assessed using parental report questionnaires may not play a direct role in determining infant reactions in the Strange Situation. They also do not support claims regarding indirect influences of temperament on attachment, although they do not rule out the possibility that an interaction between maternal and infantile temperament determines the "goodness of fit" between them, and thus the quality of their interaction.

The purpose of this second validational study was to relate parent-report measures of these two important constructs, i.e., certain aspects of the multi-dimensional attachment construct as operationalized by means of Perceived Security, and temperament with the help of a Dutch version of Bates' Infant Characteristics Questionnaire (ICQ).

In caregiver-report questionnaire research, a central question is to what extent the caregiver's perception of the child's characteristics and behavior corresponds with its "real" characteristics: is perceived temperament (about) the same as the child's "real" behavioral style? Some researchers regard (difficult) temperament as a so-called "within-the-infant-characteristic", irrespective of the caregivers' perceptions (e.g., Thomas & Chess, 1977), while others hold the view that both components are intertwined: "reality" and attribution should be considered inseparable (cf. Bates, 1980). The same question arises with respect to caregivers' reports on attachment behavior, particularly regarding the child's feelings of (in)security in stressful situations, as assessed by means of the Perceived Security scale.

Comparing questionnaire data with observational results provides insight into the correspondence between caregivers' perceptions and "actual" behavior (or is it better to speak of the researcher's perceptions?). In such validational studies, rather low levels of agreement between questionnaire and observational data may be found. For instance, Bates and Bayles (1984, p.121) found only 4% to 10% common variance when maternal ratings of the child's temperament were compared to observational data. Recall that in the first validational study summarized in the previous section, we found an overlap of 21% variance between maternal ratings of attachment (i.e., Perceived Security) and observational data. It seems that only a modest proportion of the variance in parental ratings of both characteristics has been accounted for by more "objective" observations. This does not at all, however, invalidate the use of caregiver reports, for it is important to emphasize that parental perceptions are part of the child's rearing context, and are also likely to have major influence on parent-child interaction and thereby on the child's behavior. Moreover, because of the caregivers' extensive observations of their children, one may assume that such reports in a way complete the "objectively" obtained observational data. Yet, the low to modest (cor)relations existing between questionnaire data and observational indexes lead to a relativistic posture towards the import of caregivers' reports, and they provoke a continuous quest for additional approaches.

Nevertheless, in the present study we have confined ourselves to parent-report questionnaires for two reasons: First, validational research of the kind just mentioned was already carried out with respect to temperament and perceived security. Secondly, research into the *discriminant* validity of two scales purporting to measure different but possibly related constructs is still missing. These two scales are Bates' Infant Characteristics Questionnaire (ICQ, cf. Bates, Freeland, & Lounsbury, 1979; Kohnstamm, 1984), a parent-report measure for temperament, and the already introduced Perceived Security scale, purporting to measure certain "attachment-relevant" behavioral characteristics in the child's everyday life. "Temperament" refers to the formal aspects of the child's behavior, i.e., the child's characteristic behavioral style in several different situations. "Attachment" refers to the affective quality of the parent-child interaction and particularly to feelings of anxiety and security in separations from and reunions with the attachment figure.

Scales purporting to measure these different constructs (in whole or in part) must produce a reasonable amount of discriminant validity to be useful in an empirical discussion on the relation between temperament and attachment. In the present study, we expected most subscales of Bates' ICQ to have low correlations with Perceived Security, with the exception of the subscale "Adaptability". In view of the content of the items which usually make up this subscale (e.g., "How does your child typically respond to a new person?" (item 9), "How does your child typically respond to being in a new place?" (item 10), and "How well does your child adapt to new experiences?" (item 11)), it may be concluded that this subscale partly aims at behavioral characteristics similar to those measured by Perceived Security (see the Appendix), which probably leads to a rather high degree of convergent validity. If this is true, the subscale "Adaptability" should be considered a strange element in the temperamental domain.

A final word about the purpose of the present study. In discussions on the relationship between temperament and attachment one frequently comes across statements concerning the predictive value of early temperament measures with respect to later attachment behavior. It should be emphasized that the present study is a cross-sectional study carried out with various age-groups, and set up to examine the relationships between both characteristics at the same moment in the child's development.

Method: sample and construction of variables

Sample. The study was conducted with complete families (father, mother, and children living together) having at least one child between the ages of 10 and 32 months. The families participating in the study lived in and around the Dutch city of Leiden. Data collection took place from February to August of 1982. In the first instance, 566 families with a child in the relevant age range seemed suited to the purpose. Of this group, 99 families refused to participate with only a few giving a reason for their refusal, for example, anger at the researcher's knowing their addresses. The questionnaire was then sent to the remaining group of 467 families and at lack of response, a maximum of two reminders followed. In this way, 413 families were ultimately used in the study (88% of the "non-refusers", and 73% of the original sample). Of the non-respondents who were willing to provide information on their socio-economic status (43%), 61% belonged to a lower SES-level, and 39% to higher SES-levels. The mean SES-score in the sample was 4.6 (s.d.=1.5), using the frequently applied Dutch SES-index of Van Westerlaak, Kropman, and Collaris (1975).

Goldsmith and Campos (1982) warn explicitly against attempts to assess temperamental characteristics across too broad an age range, pointing to such factors as cognitive and motoric development which affect the expression of temperament in infants and young children. Also, Bates studied temperament while using homogeneous age-groups (6, 13, and 24 months respectively). The large-scale Dutch temperamental study of Kohnstamm (1984) even made use of 9 age-groups, in which the ages differed by no more than 3 months per group. Van IJzendoorn (1979) pointed to similar age-related changes in the development of attachment. Therefore, it was decided to conduct the study with three relatively homogeneous age-groups which remain, however, large enough to warrant the use and interpretation of the statistical analyses we conducted. In this way the following three groups were formed:

1. Group I, or the youngest group, made up of 97 children with a mean age of about 1.5 years ($\bar{X}$=18.8 months, s.d.=1, minimum 16, maximum 20 months);
2. Group II, or the middle group, consisting of 123 children, with a mean age of slightly more than two years ($\bar{X}$=24.2 months, s.d.=1.5, minimum 22, maximum 26 months);
3. Group III, or the eldest group, made up of 119 children with a mean age of slightly less than 2.5 years ($\bar{X}$=29.6 months, s.d.=1.2, minimum 28, maximum 32 months).

The age-range of 10-15 months comprising only 23 children, was too small a group in view of the analyses to be conducted, and was therefore deleted.

The total remaining group (n=339 families) consisted mainly of families with one or two children (33.5%, and 51.6%, respectively); 12.5% of the families had three children, and 2.4% four or five. The mothers in this group had a mean age of 31.5 years (s.d.=3.9, minimum 21, maximum 44 years), the fathers averaged 34.6 years (s.d.=4, minimum 23, maximum 48 years). The total group comprised 174 girls and 165 boys.

Variables. The by now familiar Perceived Security scale was used to assess one aspect of the multi-dimensional attachment construct, i.e., the degree to which a child feels secure in the more or less strange, potentially threatening situations it is likely to encounter in everyday life. The 13 items used in the present study (cf. the Appendix, more specifically the items indicated by "b") yielded a reliable summative score of .84 in group III (the eldest group) and .85 in the total group and the groups I and II (as assessed with the help of Cronbach's alpha). Low scores indicate a low security as perceived by the mothers, higher scores reflect a higher degree of perceived security. As you recall from results of the first validational study discussed previously, the scale clearly makes a distinction between B4- and C-children on the one hand, and the remaining subgroups (A, B1, B2, and B3) on the other. These latter subgroups seem to be indistinguishable with respect to perceived security.

The Dutch version of Bates' ICQ (also known as "N-ICQ") was used to assess temperament. Kohnstamm (1984) had used this version in a large-scale study, carried out in 1982, in which more than 7000 parents were involved. Kohnstamm's youngest group was aged 2-4 months, the eldest group 31 months and more, and for each of the 9 different age-groups, data were analyzed by means of factor analysis (cf. Duijvelaar, 1983). In (nearly) all age-groups, the factor structure found by Kohnstamm and Duijvelaar pointed to the existence of four temperamental dimensions:

- "Crying/Easy-Difficult"
- "Adaptability"
- "Persistent"
- "Cuddly"

The data of the present study were subjected to factor analysis and subsequent internal consistency checks with a view to finding a limited number of relatively independent temperamental dimensions (cf. Huitt & Ashton, 1982). Continuously and at each stage of the analysis, our results were compared with Kohnstamm's findings. Furthermore, we attempted to construct temperamental dimensions which were stable across the entire age-range without forcing the data into a predetermined structure. As in Kohnstamm's study, in our analyses the factor structure based on the four-factor solutions (and, to a lesser extent, the five-factor solutions) yielded the best interpretation of the data. In addition, it produced the highest agreement between the results of the various age-groups (the method used was "principal axes factoring" with iterations, performed with the help of SPSS). The results of the analyses led to a dimensional structure very similar to Kohnstamm's findings.

1. A "Crying/Easy-Difficult" dimension, which indicates how often, in general, a child cries or fusses, how irritable

it is, how intensely it cries and how much attention it generally demands from its caregivers. This dimension also reflects the mother's opinion of how difficult the child is, for other parents as well as for herself. The scale used to assess this dimension was made up of 8 items (in terms of Bates' ICQ the items 5, 6, 13, 21, 23, 24, 32, and 33), with internal consistency values (Cronbach's alpha) of .75 (group II), .79 (total group, and group III), and .83 (group I). A low score on this scale indicates a relatively "easy" temperament, higher scores point to a relatively "difficult" temperament.

2. The second dimension, "Adaptability", reflects the child's ability to adjust itself to new circumstances. Does it respond positively or anxiously and resistantly to new environments as well as strangers? The scale used comprised three items (Bates' numbers 9, 10, and 11), with internal consistency values of .72 (group I), .75 (group II), .77 (total group), and .82 (group III). A high score indicates a low degree of adaptability, a low score the reverse.

3. The third dimension, "Cuddly", indicates whether or not the child likes to be picked up or cuddled, and how often it insists on it by nestling close to mother or father. For the measurement of this dimension, we used the summative score over only two items (Bates' numbers 19 and 26), as did Kohnstamm and, in fact, Bates himself. A low score indicates that the child dislikes being cuddled, higher scores point to the reverse. Cronbach's alpha was .58 (group II), .64 (total group), and .66 (in groups I and III).

4. The fourth dimension, "Persistent", reflects the child's obedience and docility: does the child abandon things it is not allowed to touch or, on the contrary, does it persist in such "disobedient" behavior? Does the child, time and again, attempt to get to places it should not enter or come near? Two items (Bates' numbers 28 and 29) were used to assess this dimension; the internal consistency of the summative score was .70 (group II), .79 (total group), .82 (group III), and .83 (group I). A high score indicates a relatively disobedient, "naughty" type of behavior, whereas a low score points to a more compliant behavioral style.

5. Finally, there is "Mood". This dimension indicates how often the child is cheerful and what may be considered its typical mood (cheerful or rather sober). In this case, too, two items (Bates' numbers 16 and 17) were used to assess this dimension, with internal consistency values of .57 (group I), .70 (total group), .72 (group III), and .74

(group II). High scores point to a rather sober, dejected mood, low scores to relatively cheerful behavior.

Especially with respect to the first three dimensions, the results of our analyses correspond strongly with those obtained by Kohnstamm and Duijvelaar. With a few exceptions, the dimensions are almost completely made up of the same items. However, Kohnstamm's fourth dimension, "Persistent", did not emerge as clearly from our varimax rotated solutions. In some subgroups it formed part of the first dimension ("Crying/Easy-Difficult"), while in another it showed a tendency to load with approximately equal strength on two different factors. In most groups, however, the unrotated factor solution pointed to the existence of a separate factor, strongly dominated by the items 28 and 29. Both items show high intercorrelations as well as low correlations with the other temperamental dimensions. On these grounds, it was decided to accept "Persistent" as the fourth dimension. The same holds more or less true for the last dimension, "Mood". In this case, too, both items used (16 and 17) were highly intercorrelated, and showed relatively low correlations with the other dimensions. Bates, Kohnstamm (and Jansen, 1984, in another Dutch study), had occasionally come across this dimension.

It should be emphasized, however, that the dimensions "Persistent" and, in particular, "Mood" are of a somewhat "artificial" nature as compared to the first three dimensions.

The first dimension, "Crying/Easy-Difficult", had a somewhat varying composition in the three age-groups. For the final analysis we chose the dimension described above, composed of items which, based on the four-factor solution, played an important role in all groups. For each age-group, however, there are some (minor) deviations from the "optimal" summative score. Therefore, we examined the correlations between the first dimension and the "optimal" summative score for each group (consisting of the 7-9 highest loading, discriminating items on the first factor). For groups I and II these correlations were .93 and .92, respectively, for group III .81 (we will return to this point later). As to "Adaptability", the other dimension with minor fluctuations in the various groups, all correlations between the abovementioned dimension and the "optimal" summative score were at least .93.

The internal consistency values of the various dimensions reported above are generally in agreement with Kohnstamm's (1984) results in similar age-groups. Although both Kohnstamm and Jansen (1984) at times found a "Mood" dimension, they did not report on its internal consistency.

Background characteristics. Apart from Perceived Security and the five Temperamental dimensions, we also included a number of background variables in the analyses, namely the child's sex and age, the number of children in the family and the family's SES-level.

Results

Table 1 gives the means and standard deviations of the variables used in the various analyses. The high SES-score is rather conspicuous and a reason to be cautious as to the external validity of the results. The mean scores on the five temperamental dimensions are all rather low; among other things, this indicates that the children were perceived as relatively "easy". Furthermore, they were perceived as rather cheerful and adaptive.

The mean score on the Perceived Security scale lies very close to the middle of the score distribution; in the total group, this score follows a nearly perfect normal distribution. None of the variables presented in Table 1 differentiated significantly between the three age-groups (as tested by one-way ANOVA's). Sex differences were found with respect to Perceived Security in group II ($\bar{X}$boys=32.9, s.d.=6.6, $\bar{X}$girls =35.5, s.d.=6.4., t=2.15, df=121, p=.033, two-tailed), and almost found in the total group ($\bar{X}$boys=34.04, s.d.=6.6, $\bar{X}$girls=35.4, s.d.=6.4, t=1.91, df=337, p=.057, two-tailed).

Table 1
Mean scores and standard deviations (in parentheses) for background variables, Temperamental dimensions and Perceived Security

Variables	Total group (n=339)	Group I (n=97)	Group II (n=123)	Group III (n=119)
Background variables:				
SES	4.5 (1.5)	4.6 (1.5)	4.6 (1.5)	4.3 (1.6)
Age of child	24.4 (4.5)	18.8 (1.0)	24.2 (1.5)	29.6 (1.2)
Number of children	1.8 (.75)	1.8 (.72)	1.9 (.76)	1.8 (.76)
Sex of child[a]	174f/165m	48f/49m	74f/49m	52f/67m
Temperamental dimensions:				
Crying/Easy-Difficult	26.2 (6.4)	26.0 (6.9)	26.2 (6.0)	26.4 (6.5)
Adaptability	8.4 (3.4)	8.7 (3.2)	8.7 (3.4)	7.8 (3.4)
Cuddly	6.9 (2.2)	6.8 (2.4)	7.0 (2.0)	6.9 (2.3)
Persistent	7.5 (2.8)	7.8 (2.8)	7.6 (2.6)	7.1 (3.0)
Mood	4.5 (1.7)	4.2 (1.5)	4.6 (1.8)	4.5 (1.8)
Perceived security	34.7 (6.6)	34.0 (6.4)	34.5 (6.6)	35.6 (6.7)

Note. The ranges of the measures are as follows: Crying/Easy-Difficult 8-56; Adaptability 3-21; Cuddly, Persistent and Mood 2-14; Perceived Security 13-55; for the background variables, see text.

[a] In this case the values represent the number of females (f) and males (m)

In the other groups, too, boys possessed lower mean scores than girls on Perceived Security, but these differences were not significant. The finding that both sexes did not differ on the various temperamental dimensions is consonant with recent results obtained by Maziade, Boudreault, Thivierge, Caperaà, and Côté (1984) in Quebec and is in line with Buss and Plomin's (1975) remark that sex differences in temperament are not to be expected before the child's fourth year.

By means of several multiple regression analyses, it was examined whether and to what extent the Perceived Security scale-scores can be explained in terms of the five temperamental dimensions. In the total group as well as in each of the three age-groups, we used hierarchical, stepwise procedures. In this context, the term "hierarchical" means that we first entered the various background variables into the analysis. Thereupon, the five temperamental dimensions were entered as a second set. The results for the various groups are presented in the Tables 2a through 2d.

Table 2
Stepwise Multiple Correlation between background variables and Temperamental dimensions (predictors) and Perceived Security (criterion), based on multiple regression analysis

2a Total group (n=339)

Step	Variable	Beta	r	R	R^2
1	SES	.12	.19	.19	.04
2	Adaptability	-.56	-.64	.65	.43
3	Crying/Easy-Difficult	-.18	-.32	.67	.45
4	Persistent	.13	.12	.68	.46
5	Cuddly	.11	.15	.69	.47

Equation: $F_{(5,331)}=59.4$, $p=.0000$

2b Group I (n=97)

Step	Variable	Beta	r	R	R^2
1	Adaptability	-.71	-.73	.73	.54
2	Cuddly	.21	.30	.76	.58

Equation: $F_{(2,93)}=63.9$, $p=.0000$

2c Group II (n=123)

Step	Variable	Beta	r	R	R^2
1	SES	.16	.33	.33	.11
2	Adaptability	-.46	-.63	.65	.42
3	Crying/Easy-Difficult	-.29	-.42	.68	.46
4	Persistent	.19	.14	.70	.49

Equation: $F_{(4,118)}=28$, $p=.0000$

2d Group III (n=119)

Step	Variable	Beta	r	R	R^2
1	Adaptability	-.58	-.58	.58	.34

Equation: $F_{(1,116)}=60.1$, $p=.0000$

Note: All beta weights are significant (at least $p<.05$);the same holds for R and R^2 increment; in group II, the correlation coefficient (r) between Persistent and Perceived Security (.14) is not significant, as contrasted with all other coefficients reported (at least $p<.05$, two-tailed).

Table 2 presents the "predictors" in the order selected by the stepwise procedure itself. Furthermore, for each "predictor" one finds, respectively, the value of the "raw" correlation (Pearson), the standardized regression weight (Beta), the value of the multiple correlation (R), and R^2, the square of R which is about equal to the proportion of variance in the Perceived Security scale-scores to be explained by a given predictor set. The table lists only those variables which contributed significantly to R^2 and produced significant beta weights. As expected the results of the various analyses clearly show that in all the groups, the temperamental dimension "Adaptability" by far has the strongest correlation with Perceived Security. In group III none of the other variables even approached significance. After "Adaptability" (and at a rather great distance), the key concept of Bates' ICQ, "Crying/ Easy-Difficult", yields the second largest contribution, although its contribution in the total group is rather small. As to the background variables, SES plays a minor role, and only in the results of the total group: Perceived Security seems to increase with rising SES. But we are dealing here with very weak relationships.

The relationships found are mostly in the expected direction; a higher degree of Perceived Security is associated with a relatively high score on the "Adaptability" dimension as well as with a relatively "easy" temperament. Furthermore, a relatively low need of being cuddled is associated with a higher score on Perceived Security. In the total group, this relationship between "Cuddly" and Perceived Security is of little importance, but in group I, the youngest group, this relationship is somewhat more prominent. That a higher score on "Persistent" (a display of "naughty" behavior) seems to be associated with higher perceived security-scores is rather remarkable. We must add that in this case, too, the relationships found are rather weak. Actually, "Crying/Easy-Difficult" plays a role of some importance only in group II. In both the youngest and the eldest age-groups, this temperamental dimension does not make any contribution to the "prediction" of Perceived Security.[3]

Repeating the regression analyses with the "optimal" summative score for each age-group on the "Crying/Easy-Difficult" dimension, yielded only very small differences as compared to the results presented in Table 2. This applies, for that matter, in group III as well (cf. our comment in a previous section). It may well be that the varying composition of the "difficultness"-factor across several age-groups has some relevance from a developmental perspective (in other words, what characteristics constitute a child's temperamental "difficultness" as perceived by the caregiver), but at the same time it may be concluded that this hardly seems to have any bearing on the relationship with Perceived Security.

Discussion

As was to be expected, we found a high degree of convergent validity between the temperamental dimension "Adaptability" and Perceived Security. Their common variance fluctuates between 31% and 54%. Moreover, the correlations between this subscale and the remaining four temperamental dimensions are considerably smaller, with the highest r reaching a value of .41 (with "Mood", in group II), or 16% of common variance. In such cases, one usually concludes that "Items which correlate higher in another cluster probably belong in that cluster, rather than in the one originally chosen" (Bohrnstedt, 1977, p.96). Applying a reverse strategy, that is characterizing the Perceived Security-items as "Adaptability"-items, seems to be rather far-fetched, since such a strategy would result in "watering-down" the construct of "temperament" by giving it too much extension. More important, however, is that such a strategy seems hardly tenable given the content of the items concerned: they have been constructed to reflect directly "natural" equivalents of the events taking place in the Strange Situation, a procedure explicitly designed to assess attachment behavior.

Starting from the validity of the Strange Situation (cf. Ainsworth et al., 1978), and taking into account the existence of a certain extent of convergent validity between the Perceived Security scale and the Strange Situation (as was demonstrated in the first validational study discussed previously), we take the line that a high correlation between one of the ICQ's subscales and Perceived Security points rather strongly in the direction of Bohrnstedt's conclusion.

Because "Adaptability" always appeared as the first temperamental dimension to be taken up in the equation, the beta weights associated with the other dimensions illustrate how much common variance remains between Temperament and Perceived Security after the entry of "Adaptability". As Table 2 shows, in the total group only 4% of common variance remains, while in the three age-groups individually this percentage runs from 7% in group II to 0% in group III. In other words, there is a high degree of discriminant validity; the two scales purport to measure two different constructs, and they very well succeed in accomplishing this goal, given the small percentages of common variance between Temperament and Perceived Security. The only exception, of course, is the "Adaptability" dimension.

Aside from the fact that the ICQ's factor structure was largely "confirmed" in the present study, these results corroborate the construct validity of the instrument. It should be added, however, that the subscale "Adaptability" might seriously bias an empirical discussion on the relationship between temperament and attachment. For this subscale overlaps with Perceived Security to such an extent that it is hardly tenable to conceive of it as a temperamental dimension without putting at risk the ICQ's construct validity. In our view, it is therefore highly recommended that future researchers into the relationship between temperament and attachment (should they use the ICQ or a similar instrument for the assessment of temperament) eliminate the subscale "Adaptability" or similar dimensions. In view of the small number of items making up this dimension this would not, from a technical point of view, mean too great a loss either.

THE EXTENSION HYPOTHESIS AND PERCEIVED SECURITY

The samples used in the two empirical studies to be reported on in the following sections consisted of complete families (mother, father, and children living together), living in or in the neighborhood of the Dutch city of Leiden. The data collection phase of the first study took place from the late fall of 1979 to the early spring of 1980; for the second study, data were collected between April and August of 1981. The group of families participating in the second study (*n*=140) consisted, with a few exceptions, of a subsample from the 166 families investigated in the first study. In both studies, the criterion variable used was the Perceived Security scale, which was related to several different independent variables ("predictors") globally introduced at the outset of this chapter. In later sections we will dwell at greater length on the operationalization and measurement of the variables used. For now, though, we continue with a description of the group of families participating in the first study.

THE FIRST STUDY

Description of the sample

The investigation started with a group of 237 families in Leiden that met the requirements of being a married couple with at least two children between the ages of 0 and 3.5 years. After four efforts of recruitment, 183 families (over

77%) proved willing to participate in the study (an analysis of the influence of nonresponse on a number of important variables gave no reason to assume that the nonrespondents formed a systematically deviant subgroup within the population, cf. Van IJzendoorn, Tavecchio, Goossens, & Souverein, 1980, pp.93-99). The group of families ultimately investigated, however, consisted of 166 families; 17 families with twins were left out of the main analysis and were studied separately (cf. Jansen, 1980). Most of these 166 families had two children (84.9%), 9.6% had three, the rest four or more children. The age of the youngest child averaged 8.7 months (s.d.=4.6), that of the next to youngest child 29.8 months (s.d.=5.0). The mothers' ages averaged 29 years (s.d.= 3.9), the fathers 31 years (s.d.=3.6). In this group of 166 families, 28 wives (17%) worked outside the home, in nearly all cases on a part-time basis. Only three wives had full-time jobs.

From each family we selected a "target"-child to be used in the various analyses. This child had to fulfil the condition of being between 10 and 30 months of age, or of being as near to this interval as possible. The thus selected children had a mean age of 23 months (s.d.=8.4); 89 of them were boys, 77 were girls.

The families' socio-economic status, as assessed by means of the frequently used Dutch SES-index of Van Westerlaak et al. (1975), was rather unevenly distributed; the higher echelons were overrepresented (mean score 4.6, s.d.=1.4, on a scale ranging from 1 ("unskilled worker") to 6 ("academic level")). As in the second study, data of this first study were collected by means of a questionnaire sent by mail to each family in the population. In an accompanying letter it was strongly emphasized that each parent should fill in the questionnaire individually and independently (we ran across some systematic discrepancies in the answers of the spouses to questions concerning motives for parenthood, goals in rearing, etc., that would not necessarily be expected if the questionnaires had not been filled in independently of one another, cf. Van IJzendoorn & Tavecchio, 1982). For a more elaborate profile of these families the reader is referred to a detailed description of their life style, in which rather extensive attention was paid to the division of tasks and responsibilities between the spouses (cf. Tavecchio, Van IJzendoorn, Goossens, & Vergeer, 1983; 1984).

Description of variables

The criterion variable, "Perceived Security", was measured with the help of 3- and 4-point rating-scales, on which the mothers were asked to indicate to what extent their child displays fear, anxiety or sorrow when alone, in unfamiliar surroundings, or in contacts with relative strangers, etc. (cf. the Appendix, more specifically the items indicated by "c").

In this first study with the scale eight items proved to be stable (that is, they yielded satisfactory test-retest reliability results after an interval of about 6 weeks; 20 randomly chosen families were used for the analysis). The summative score over these eight stable items reached an internal consistency value of .67 (Cronbach's alpha).

As mentioned at the outset of this chapter, perceived security scores have been related to a number of variables ("predictors") to be regarded as operationalizations of certain aspects of the "extension hypothesis". In the present study they were the following:

1. Working status of the mother ("maternal employment"), used as a dichotomous score: is she a full-time homemaker or does she have a full-time or part-time job?
2. The child's overnight separations, i.e., the number of nights the child spent away from home, for example, by staying at a friend's or relative's house;
3. The child's day care attendance; whether or not the child visits nurseries, day care centers etc., also measured dichotomously.

These three variables all concern quantitative aspects of the rearing context. We regard them as measures relating to the "quantitative density" of this context, and they have been operationalized by inquiring about direct, actual data. As we mentioned earlier, 28 wives (17%) worked outside the home, only three of them full-time. Slightly more than one-third (36%) of the children attended nurseries and/or day care centers regularly.

A second group of measures for the rearing context's "quantitative density" concerns the division of tasks and responsibilities between the spouses. Specifically, we were interested in the degree to which the father played a role in extending the rearing context. The three variables used to characterize the task division between the spouses are the summative scores on three factors emerging from a principal components analysis performed on a number of 15 items regarding the *actual* task division between the spouses (cf. Tavecchio et al., 1983, 1984, for a detailed report). These three variables are the following:

4. The "care factor", an index based on the summative score over 6 activities generally ascribed to a traditional "female" family role (e.g., "making the beds", "diapering the baby", "vacuuming");

5. A "chore factor", the summative score over 4 activities ascribed to a traditional "male" family role (e.g., fixing a flat (bicycle) tire", "changing a fuse");

6. An "interaction (or "pedagogical") factor", the summative score over 3 items which appeared to be less exclusively associated with one specific parent (e.g., "tussling with the children", "reading to the children").

Lower scores on these three variables indicate that the task concerned is performed more by the husband; higher scores point to a greater participation on the part of the wife.

Along with quantitative aspects of the rearing context, we also paid attention to qualitative aspects. Three attitudinal variables were used to characterize the "qualitative density" of the child's rearing context:

7. The attitude towards the mother's working outside the home, and

8. The attitude towards the father's working part-time,

both variables measuring the degree to which the mother's working outside the home or the father's part-time employment were judged "favorable" for the raising of young children (the 5-point scale used ran from (1) "very unfavorable" to (5) "very favorable");

9. Maternal involvement with child-rearing; a measure varying between the two poles of (anxious) overconcern ("overprotectiveness") and a more relativistic or "distant" attitude towards child-rearing (which only in its most extreme form might develop into "neglect"). The items used to measure this variable originate from a study conducted by Engfer and Schneewind (1976) in Western Germany, in particular from their dimensions *"Erzieherisches Engagement"* ("commitment to child-rearing", originally composed of 8 items), and *"Verantwortung"* ("parental sense of responsibility", originally consisting of 7 items). Engfer & Schneewind's factor structure could, however, not be confirmed in the present study. Of the items that loaded on a single first factor (in *our* analysis, that is), 7 items remained, after removing items showing low test-retest reliability and/or low internal consistency values. The summative score over these 7 items was used for the assessment of "maternal involvement with child-rearing", a dimension reflecting the degree of "distance" versus "overconcern". The internal consistency (Cronbach's alpha) was .67. Lower scores indicate a tendency to display overconcern, higher scores on this dimension point to a more relativistic posture towards child-rearing. Examples of the items used are: "What my child does, thinks, and feels is of greater interest to me

than all other things", or "I spend every spare moment with my child" (originally belonging to Engfer & Schneewind's *"Erzieherisches Engagement"* dimension), and "With anything my child does I extend a helping hand", or "I take full responsibility for anything my child does" (originally part of Engfer & Schneewind's *"Verantwortung"* dimension).

Intervening variables

In addition, a number of possibly intervening variables were incorporated into the analyses, namely:

1. The family's "cultural-educational" level, that is, the degree to which parents are inclined to stimulate cultural abilities deemed to foster the child's intellectual development (cf. Rupp, 1969; Meijnen, 1977). Mothers were asked to indicate on a 4-point scale (running from (1) "not at all important" to (4) "very important") the importance they attached to activities like "reading to the children", "playing games with the children" or "correcting grammatical errors in the child's speech". The summative score over 5 items reached an internal consistency value of .69 (Cronbach's alpha). Low scores point to a relatively low degree of importance, higher scores indicate a higher degree of importance attached to these activities by the mothers concerned;
2. Motives for parenthood; based on a study of Out and Zegveld (1977), the mothers were asked to rate the importance of 13 motives for parenthood. Five of these were eliminated because of low test-retest reliability results. A principal components analysis on the remaining 8 items pointed to a unidimensional factor structure. For the main analysis, we used the summative score over these 8 items, its internal consistency value being .70 (Cronbach's alpha). Examples of items are: "Having children is a new experience", "You can directly transfer your own views and ideals to your children", etc. Lower scores indicate rather strong motives, higher scores point to the reverse.
3. The parental measures to punish the child. This behavior was measured with the help of two questions, first by asking for the frequency of punishment by "leaving the child alone" (for example, in another room), and secondly by asking for the frequency of punishment by "love withdrawal". Bowlby (1975, p.388) regards these two forms of punishment as conducive to the development of insecure attachment behavior. The summative score over both items was used in subsequent analyses. Higher scores point to a

rather infrequent use of punishment, whereas lower scores indicate a relatively frequent use of these measures.

General overview of the variables used in the first study

Figure 1 presents the variables thus far discussed in a more schematic fashion. We have added some possibly relevant background characteristics, such as SES-level, age and sex of the child. From the schematic representation, it may be inferred that Perceived Security, (the maternal perception of "attachment-relevant" behavior in potentially threatening everyday situations) should be regarded as a variable to be (partially) dependent on the variables forming part of the clusters II through IV (the "predictor", and "intervening" variables). The relationships between the various variables have not been specified by lines to avoid the impression that in this first study of Perceived Security and its correlates we would be capable of achieving much more than the formulation of a number of overall expectations. The predicting variables have been arranged in such a way, however, that in going from left to right one may assume a weak causal ordering to exist among the various clusters (as indicated by an arrow). Thus, it is assumed that such background characteristics as SES, age and sex of the child are exogeneous variables which are not influenced by the other variables in Figure 1.

INDEPENDENT VARIABLES				CRITERION
SES	Maternal employment	Daycare attendance Care factor	Attitude towards the mother's working outside the home	
Age of the child Sex of the child	Motives for parenthood	Chore factor Interaction factor	Attitude towards the father's working part-time	PERCEIVED SECURITY
		Maternal involvement with child-rearing	Number of overnight separations	
		Cultural-educational level	Punishment behavior	
(I)	(II)	(III)	(IV)	(V)

→
Direction of causality

Figure 1. Schematic representation of the relationship between Perceived Security and several sets of independent variables

The mother's working status and her motives for parenthood are conceived of as characteristics which are more likely to influence the subsequent variables than the other way around. Also, in our opinion, the task division between the spouses, particularly the father's contribution, will result primarily from the mother's working status, and not the other way around. The same holds for the relationship between motives for parenthood (which manifest themselves at an earlier stage), and such characteristics as "maternal involvement with child-rearing", or "cultural-educational level" of the family, which in their turn are of a more preliminary nature than for instance such concrete child-rearing "measures" as punishment. Finally, it was assumed that attitudes towards the "mother's working outside the home" or towards "the father's working part-time", are formed primarily by concrete experiences with the actual division of tasks in the family, and by the parents' more basic child-rearing attitudes.

Results

The relationship between Perceived Security and the independent variables listed in Figure 1 was studied by performing multiple regression analyses with Perceived Security as criterion variable. The central question may be formulated as follows: In what way and to what extent can the variance in Perceived Security scores be explained from the variance in (combinations of) the predicting and intervening variables. In view of the preliminary character of the present study, then, multiple regression should be considered an explanatory rather than a predictive method of analysis (cf. Kerlinger & Pedhazur, 1973, p.49).

In order to obtain as complete a picture as possible, we started by entering all (15) independent variables into the analysis, employing a stepwise procedure without restrictions. "Number of overnight separations" and "sex of the child" were not included in the equation. The remaining 13 variables, taken together, explained 14% of the variance in the Perceived Security scores (with a significant R of .37 (F=1.85, p<.05). Among these 13 variables, the first four taken together explained about 10% of the variance, the remaining 9 taken together adding only 4%. Among the first four variables, two obtained significant beta weights (p<.05), namely, "maternal employment" (Beta: -.24), and "maternal involvement with child-rearing" (Beta: .21); the other two were the "interaction factor", and "attitude towards the father's working part-time (both not significant). The variables contributing significantly are of crucial importance to the extension hypothesis: "maternal employment" forms an essential aspect of the rearing context's "quantitative density", whereas "maternal involvement with child-rearing" is the most important operationalization of the "qualitative density" of the child's rearing context. According to the sign of the beta weights, these results are to be interpreted as follows: an increasing tendency of the mothers to take a relativistic (more "distant") attitude towards child-rearing is associated with an increase in Perceived Security; secondly, "maternal employment" is associated with higher scores on the Perceived Security scale as well. The relationships, albeit significant, are relatively weak.

Another important finding is that Perceived Security hardly seems to be related to the child's age or SES-level (the beta weights concerned having values of -.03 and -.07, respectively). Therefore, it seems likely that Perceived Security is a dimension relatively independent of age and SES. In the present study, the child's day care attendance hardly explained any variance in the perceived security scores (beta weight: -.07). This result is in agreement with findings reported by Kagan et al. (1978), who did not find any pronounced effects of day care attendance on the development of attachment. Thus, the (preconceived) opinion regarding a negative relationship between the child's day care attendance and the quality of the emotional bond between parents and child was not supported by the results of either study.

In performing the multiple regression analysis just described, we were looking for the "best" among several potentially explanatory variables. Next, we applied a hierarchical, stepwise procedure to the data (cf. Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975, pp.336 and 344-345), starting from the weak causal ordering among the variables as depicted in Figure 1. This time, the various clusters of independent variables were entered separately into the analysis, so that along with their "direct" effects, the "indirect" effects of the independent variables could be assessed as well. Furthermore, we used a significance level of 5% for entering the variables into the equation (PIN=.05). Table 3 gives the results of this hierarchical, stepwise procedure. As compared to the results of the preliminary analysis just discussed, it may be concluded that the four most prominent variables have maintained their position. However, along with "maternal employment" and "maternal involvement with child-rearing", both other variables, i.e., the "interaction factor" and the "attitude towards the father's working part-time", now show a significant relationship with Perceived Security. The remaining 9 variables, together explaining only about 4% of the variance in Perceived Security, are now no longer part of the equation. The proportion of explained variance (R^2) has de-

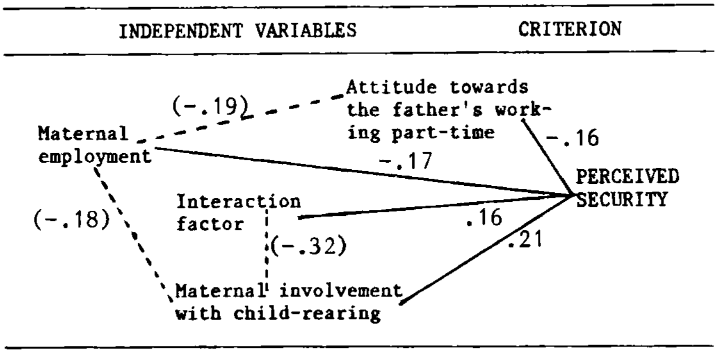
Table 3:
Hierarchical stepwise regression of Perceived Security on the most important independent variables (PIN=.05)

Variable	Beta	*F*	*R*	R^2	R^2 increment	*F*
1. Maternal employment	-.17	4.57*	.16	.024	.024	4.27*
2. Maternal involvement with child-rearing	.21	6.88**	.22	.049	.025	4.45*
3. Attitude towards the father's working part-time	-.16	4.55*	.27	.072	.023	4.09*
4. Interaction factor	.16	4.05*	.31	.095	.023	4.09*
R=.31, F=4.24, p<.005, R^2=.10						

* p<.05; ** p<.01

creased to a level of about 10% (the multiple *R* value of .31 has remained significant, F=4.29, p<.005). It was also examined whether each of these four variables contributed significantly to this 10%. The right part of Table 3 shows that each of them yielded a significant, albeit small, contribution of about 2.5% (cf. Nie et al., 1975, pp.337-338, for the statistical testing procedure). When we look at the values of the beta weights, the relative contribution of "maternal employment" appears to have decreased somewhat (-.17). "Maternal involvement with child-rearing" now is the variable with the highest relative contribution (.21). The interpretation of both these variables' respective contributions, of course, remains unaltered. According to the accompanying beta weights, the interpretation of the contribution of the two newly added variables is as follows: the negative relationship of "attitude towards the father's working part-time" with Perceived Security (Beta: -.16) reflects a (weak) tendency of increasing Perceived Security scores to be associated with a less pronounced preference on the part of the wives for their husband's working part-time (in view of its related favorable effects on child-rearing). The wives as a group, however, do favor their husband's working part-time, over 80% of them endorsing such a choice (cf. Tavecchio et al., 1983), but at the same time the mothers of children with higher Perceived Security scores seem to value such a development somewhat less highly. As for the "interaction factor" (Beta: .16), a possible interpretation is that children from families with a more active father feel (slightly) less secure as compared with children from families with a more traditional task division between the spouses. At first sight, then, the effect of these two variables, both of them concerned with the father's role in extending the child's rearing context, seems contrary to the abovementioned interpretation of the effects of "maternal employment" and "maternal involvement with child-rearing". These clearly support the extension hypothesis: extending the child's rearing context is associated with an increase in Perceived Security. It may be that the father's role in extending the context is not only a positive one regarding its effect on the child's feelings of security (an interpretation which would run contrary to results obtained by Lamb, 1976, 1978, or Kotelchuck, 1976). A possibly relevant observation in this regard was made by Parke (1979, p.579), when he remarked on the more active father: "Too often 'more' is equated with 'improvement'; however, in many families, increased father participation may cause conflict and disruption as a result of the threat to well-established and satisfying role definitions". In a later section, we will return to the rather atypical results just described.

Evaluating the variables listed in Figure 1 and their interrelations in light of the results of the hierarchical analysis just described leads us to a pattern as presented in Figure 2. As can be seen, the original arrangement (the ordering among the variables as depicted in Figure 1) has changed rather strongly. Also, the first cluster, comprising the background characteristics, has disappeared completely. The pattern of relationships delineated in Figure 2 will serve as a guide-line for the discussion to be presented in the next section.



Solid lines: standardized regression coefficients (beta weights)
Dashed lines: (significant) correlations (r) between independent variables

Figure 2. The pattern of relationships between Perceived Security and independent variables, based on hierarchical multiple regression

Discussion

First and foremost it should be emphasized that the results of this first study are at best tentative. Basing ourselves on parent-report measures, we attempted to study some aspects of the undoubtedly very complex relationship existing between quantitative and qualitative aspects of the child's rearing context on the one hand, and the child's Perceived Security on the other.

As for the results obtained, we take the relationships between Perceived Security and a number of potentially relevant independent variables as a starting-point for the discussion. This pattern of relationships, presented in Figure 2, suggests that Perceived Security (supposedly measuring certain aspects of the multi-dimensional attachment construct), is related to "maternal employment", "maternal involvement with child-rearing", the task division between the parents concerning certain activities in the interactive domain (the "interaction factor"), and the mother's "attitude towards the father's working part-time" (so as to increase his contribution to child-rearing responsibilities). The direction of these significant, albeit modest correlations further suggests that increasing Perceived Security scores tend to be associated with the mother's working outside the home as well as the mother's somewhat relativistic ("more distant") attitude towards child-rearing. Both results clearly support the extension hypothesis introduced at the outset of the chapter, and are in contradiction with (preconceived) opinions suggesting the existence of possible negative effects of maternal employment on the child's emotional development.

On the other hand, though, the father's role in extending the child's rearing context is less unequivocal and, possibly, not entirely positive. In view of the relationships as presented in Figure 2, it seems that fathers having higher scores on the "interactive factor" (i.e., they contribute *less* to "reading to the children", "tussling", "cuddling") and whose wives appreciate their husband's working part-time to a somewhat lesser degree, have children who tend to score higher on Perceived Security. For a further analysis of these "inconsistent" findings, we examined the answers on another item in the questionnaire which asked the mothers to indicate "whether the children were attached exclusively to the mother or to the father as well". In performing a discriminant analysis on two groups of children (a group attached solely to the mother and a group attached to both parents), it was examined which variables maximally differentiated between both groups (the variables used being identical to the ones used in multiple regression). The results of this discriminant analysis suggest that exclusive attachment to the mother is associated with the child's age, the father's contribution to the "interaction factor", and the child's Perceived Security score. A closer look at these findings reveals that children attached exclusively to the mother are younger, have fathers who are less active in "interaction factor" activities, and are perceived as less secure. The reverse holds for children attached to both parents (70% of the children in the present study). These children have fathers who are more active in the "interaction factor" domain, they are somewhat older, and score *higher* on Perceived Security (cf. Van IJzendoorn et al., 1980, pp.87-88).

The discriminant analysis results therefore suggest that fathers who play a more active role in the "interaction factor" domain do have children with higher Perceived Security scores, a relationship which was at best masked and at worst contradicted in the analysis of the total group.

We call to mind that, in addition to "maternal employment", two other aspects of the rearing context's "quantitative density" had been operationalized: the child's day care attendance and the number of overnight separations (as an example of a short-term separation experience). In the present study, both variables did not contribute significantly to the "prediction" of Perceived Security. We shall return to both aspects later (in the section dealing with the results of the second study).

With respect to the validity of this first study, two comments seem relevant. First, data were collected by means of mailed questionnaires, so that the results discussed above are largely based upon opinions and attitudes of the respondents, and not on actually observed behavior. Social desirability, for example, may have biased the responses to an unknown degree.

As we discussed in a previous section, Perceived Security scores certainly do not coincide completely with Strange Situation results. Also, we strongly adhere to the point of view that observational research is a sine qua non for the study of attachment behavior. On the other hand, we hold the view that Perceived Security is part of the everyday reality of child-rearing and, thus, undoubtedly affects the mother-child interaction to a large extent. We therefore consider Perceived Security to be an important variable in its own right, bearing in mind the sometimes serious flaws inherent in the use of parent-report measures to assess complex phenomena.

A second comment regards the external validity of the results. As we mentioned earlier, the group investigated cannot be considered a random sample from the population of families that are intact and contain (very) young children. This is due to the overrepresentation of higher SES-levels in the present study.

To conclude this section, it should be added that the multiple regressions we performed were based on the assumptions that curvilinearity and interaction effects were absent (the so-called "linear-additive" approach). Tests on these assumptions proved them to be correct (cf. Van IJzendoorn et al., 1980, pp.115-120).

THE SECOND STUDY

Description of the sample

140 families participated in the second study. With a few exceptions, they formed a subset of the group of 166 families who took part in the first study. In this case, too, mailed questionnaires were used to collect the data. These data were collected between April and September of 1981, the mean SES-score remaining 4.6 (s.d.=1.3), as in the first study; 44% of the children were girls, 55% of them boys. The children involved in the study (the so-called "target"-children, cf. the introduction to the first study), averaged 26.2 months (s.d.= 5.4); 1.4% of the families had one child, 70% had two children, 22.5% three children, and the rest four or more. As in the first study, only complete families were included. The percentage of nonresponse was remarkably low (18%); it concerned, of course, largely the same group of families as in the first study. The children involved in this second study were on the average only a few months older than their counterparts in the first study, while a period of 17-20 months had elapsed between both studies. In most cases (over 70%), the children involved in the present study were siblings of those involved in the first. Of the 140 mothers participating in the second study, 31 (22%) worked outside the home; in this case, too, it concerned in most cases a part-time job.

Description of variables

In constructing the variables of the second study, a somewhat different strategy was followed compared with the first study. For example, instead of item-analysis based on test-retest reliability data, we now used "optimal scaling" methods (cf. Gifi, 1981) for the construction of a number of important variables; thereafter, Cronbach's alpha was used to assess their internal consistency values. In some cases, this approach resulted in scales that proved to be considerably more reliable than in the first study. As a case in point, we mention the study's criterion variable, the Perceived Security scale. The summative score over the optimally scaled Perceived Security-items now reached an internal consistency value of .84, based on 10 items (cf. the Appendix, more specifically the items indicated by "d", and Van IJzendoorn et al., 1983, for an illustration of the scaling procedure, similar to the one used in the present study). The rationale behind the Perceived Security scale has been explained previously at various places in the present chapter, and will not be repeated here. Again, higher scores on the scale point to a relatively high degree of perceived security, whereas lower scores indicate that the mothers concerned perceive their children as relatively less secure in the potentially threatening everyday life situations we described when introducing the scale.

The rationale behind the selection of the independent variables ("predictors") has remained identical to that of the first study. We therefore briefly introduce them in approximately the same order as in the first study. For the rearing context's "quantitative density", the following aspects were operationalized:

1. Maternal employment, a simple dichotomous score, used to differentiate working mothers from full-time homemakers;
2. The number of overnight separations (for example, the number of nights the child stayed at friend's or relative's house), in this study clearly differentiated from
3. The number of nights the child spent in a hospital, postnatally, for whatever reason ("normal" perinatal stays, of course, excluded);
4. Non-parental care, a cumulative score of the average *number of hours* that the child, according to its mother, spent weekly in nurseries or day care centers, with neighbors, relatives (e.g., grandparents), baby-sitters, etc.;
5. The child's daycare attendance, i.e., the *number of times a week* the child visits nurseries or day care centers, playgrounds, etc.;
   Although there is a certain overlapping between variables 4 and 5, both variables were analyzed separately, as they formed part of the first study's analyses;
6. The "care factor", an index based on the summative score over 8 activities generally ascribed to a "female" family role (cf. the first study); its internal consistency reached a value of .80;
7. The "chore factor", as an index of a traditionally "male" family role, now based on 4 items (Cronbach's alpha .59);

8. The "interaction factor", an index of activities less exclusively associated with one specific parent, as in the first study based on three items (Cronbach's alpha .50).

With respect to the three last-mentioned indices of the spouses' task division it should be noted that these dimensions emerged from a principal components analysis yielding results virtually identical to those of the first study. Higher scores on these dimensions indicate a greater participation in these activities on the part of the wife, lower scores point to a greater participation on the part of the husband. As in the first study, these indices of the spouses' task division were used to examine the degree to which the father made a contribution to extending the child's rearing context.

To assess the rearing context's "qualititative density", we now measured four variables, the first three of which were also present in the first study:

9. The "attitude towards the mother's working outside the home";
10. The "attitude towards the father's working part-time", and
11. "Maternal involvement with child-rearing", a summative score over 11 items.
    Along with items stemming from Engfer & Schneewind's (1976) dimensions of *"Erzieherisches Engagement"* and *"Verantwortung"*, we now also made use of items forming part of their *"Behütung"* dimension ("Protection", composed of items like "I easily reconcile myself to my child's being absent for a while", "Even though I like to be with my child, a temporary separation is immaterial to me", or "Not for one moment can I get the concern for my child out of my mind"). In this second study, too, Engfer and Schneewind's original factor structure could not be "confirmed". We therefore used the items loading on a single first factor which, after performing an optimal scaling procedure, reached an internal consistency value of .78 (based on 11 items). As in the first study, lower scores on this dimension indicate a tendency to display overconcern for the child on the part of the mother, whereas higher scores point to a more relativistic ("distant") attitude towards child-rearing.
12. The "attitude towards female social roles", a new variable based on Slade and Jenner's (1978) questionnaire, which we had previously validated on a sample of Dutch men and women (Hubbard, Van IJzendoorn, & Tavecchio, 1982). After performing an optimal scaling procedure and internal consistency checks, we used a reduced form of the scale,

made up of 14 items with an internal consistency value of .89. A high score on this scale indicates a more "liberal" view of female roles (little or no sex typing), whereas lower scores point to more traditional (perhaps "conservative") sex-typed views on "appropriate" male and female social roles. A few examples: "A good mother would not go out to work while she had a child under 5", or "A situation in which a woman works while a man stays at home and looks after the children is not right".

Remaining variables

As in the first study, a number of possibly intervening variables were analyzed as well:

1. Motives for parenthood, which, after using an optimal scaling procedure, now reached an internal consistency value of .75 (based on 11 items);
2. Parental measures for punishing. In the present study we used the scores on three frequency measures separately: 1) punishment by "love withdrawal", 2) punishment by "leaving the child alone" (both also used in the first study) and 3) punishment by "spanking the child", now added as a third instance of punishment.

As background characteristics we used SES, sex, and age of the child.

Method: canonical discriminant analysis

As in the first study, we attempted to examine in what way and to what extent maternal perceptions of the child's security in potentially threatening everyday life situations are associated with the aforementioned theoretically and practically relevant independent variables. Again, the framework of the study was provided by the extension hypothesis which, briefly, states that "extending the child's rearing context (both qualitatively and quantitatively) may increase the child's feelings of security". In this second study, however, we focused on the question whether and to what extent the various indices of an extended rearing context would discriminate between children with low and high scores on the Perceived Security scale. A technique particularly well suited to study (multivariate) differences between groups is the canonical discriminant analysis (cf. Klecka, 1980; Huberty, 1984), and it is this technique that we used in the present study.

We just mentioned that the groups to be used in the discriminant analysis were created on the basis of the maternal perceptions of the children's security in potentially threatening everyday life situations. Considering the possibility that different mothers would use different frames of reference in assessing their children's behavior, we specifically paid attention to differences between the children scoring at the lower end of the Perceived Security scale (the "bottom" 25%, perceived as relatively insecure), and those scoring at the higher end (the "top" 25%, perceived as rather secure). It may be assumed that these two groups of children, placed at the opposite ends of the scale, have been perceived as being clearly distinct from one another. On the other hand, the position of the children belonging to the remaining middle group (the "intermediate" 50%) may well have resulted from more "casual" shifts in the mothers' rating criteria instead of being brought about by actual differences in these children's behavior as compared to those belonging to both "extreme" groups. This use of discriminant analysis to distinguish between two or three groups of children compiled on the basis of their Perceived Security scores may be criticized, inasmuch as not all available information regarding their "exact" position on the scale is utilized, as was done in the first study. In that study, Perceived Security was considered a continuous criterion variable to be used in multiple regression analysis. In this second study, though, we assume this potential loss of information to be compensated by a reduction of the risk that children with similar Perceived Security scores will be placed at different scale-points, due to their mothers' diverging frames of reference in assessing their children's behavior.

Finally, it should be noted that in the context of the present study, discriminant analysis will be used as a descriptive rather than as a predictive or classificational method of analysis (cf. Huberty, 1984; Nunnally, 1978).

Results

A canonical discriminant analysis yields one (or more) discriminant function(s) on which the predetermined groups differ. These discriminant functions are linear combinations of the original variables that form dimensions on which the groups, defined by a categorical variable (in this instance the child's being a member of low, intermediate, or high scoring groups on the Perceived Security scale), are maximally separated. The various discriminant analyses subsequently to be reported on were performed in a hierarchical fashion, that is, the three background characteristics (SES, age, and sex of the child) were regarded as exogeneous and were therefore entered first into the analysis by giving them a higher inclusion level. Thereupon, the so-called endogeneous variables were entered without applying any predetermined order. The program package used was SPSS, more specifically Wilks' stepwise method.

The first discriminant analysis used three groups of children, compiled on the basis of their Perceived Security scale-scores (the "bottom" 25%, the "top" 25%, and the "intermediate" 50%). Table 4 gives the results of this analysis. The discriminating variables have been ordered on the basis of the values of their standardized discriminant function coefficients (for the sake of brevity to be called "weights"). Furthermore, we have listed (as in all tables to follow) the selected variables' so-called "structure coefficients", indicating their (bivariate) correlations with the discriminant function(s) (cf. Klecka, 1980).

Table 4
Hierarchical canonical discriminant analysis performed on "insecure" (n=35), "secure" (n=32), and "intermediate" (n=68) groups

Variables	Discriminant coefficients		Structure coefficients		Mean scores		
	F1*	F2	F1	F2	"insecure"	"secure"	"intermediate"
Number of overnight separations	.64	-.28	.66	-.31	6.7	14.4	6.9
Punishment by leaving alone	-.43	.08	-.42	.18	3.7	3.4	3.6
Attitude towards the father's working part-time	-.42	.09	-.44	.13	4.1	3.8	4.1
Non-parental care	.38	.29	.49	.52	6.0	11.6	9.9
Chore factor	.14	.80	.15	.92	6.6	7.4	7.9
Eigenvalue	.17	.07					
Can. correlation	.38	.25					
Wilks' Lambda	.80	.94					
p	.002	.07					
Centroids F1					.23	-.69	.20
Centroids F2					-.48	.15	.18

* F1 = function 1; F2 = function 2

The results show that the "secure" group of children (the "top" 25%) can be differentiated from both other groups on the basis of five discriminating variables and, more specifically, by the first function (*p*=.002). The second discriminant function is more relevant to the discrimination among the "insecure" group (the "bottom" 25%) and the rest, but its explanatory power is considerably lower (*p*=.07, not significant). The differences between the "secure" group and both other groups, described by the first function, are the following:

The "secure" group is characterized by the fact that these children experienced a greater number of overnight separations, for example at a friend's or a relative's house (actually, looking at the mean scores listed in Table 4, the differences are rather great, the secure group having spent more than twice the number of nights elsewhere as compared to both other groups). Another difference is that the "secure" group has been punished (slightly) more often by being left alone (a very small difference, though), and that these children's mothers value their husband's working part-time somewhat less highly than the mothers of the other children (in this case, too, it concerns rather small differences). The next discriminating variable, "non-parental care", seems relevant to both discriminant functions (as is testified by both the "weights" and the structure coefficients). The "insecure" children spent considerably less time in the company of other adults (neigbors, friends, relatives, or in day care) than the "secure" children (with mean scores of 6 hours and 11.6 hours a week, respectively). The last discriminating variable, the "chore factor" (reflecting activities traditionally ascribed to a "male" family role) clearly belongs to the (not significant) second discriminant function. The mothers of the "insecure" children state somewhat more often than mothers of "secure" children that the task division on the "chore factor" is more traditional. The differences are, however, rather small.

Among these 5 discriminating variables, only two - "non-parental care" and "number of overnight separations" (actually, both variables hardly show any relation to each other, *r*=.12, *p*=.15, two-tailed) - contribute rather strongly to the discrimination between the "secure" and the "insecure" groups. A number of variables which played an important role in the first study, such as "maternal employment", "maternal involvement with child-rearing", and the "interaction factor", did not contribute significantly to the differentiation between the groups. The same holds true for the "child's day care attendance" which, although operationalized more accurately than in the first study, does not belong to the discriminating variables. This result is probably best explained by its partial overlapping with "non-parental care" which, as we have seen, clearly differentiates among the groups (both variables are intercorrelated rather strongly, *r*=.55, *p*=.000, two-tailed). It should be mentioned, however, that children belonging to the "secure" group attend day care centers or nurseries about twice as often as children belonging to the "insecure" group (with mean scores of 1.0 and .46 weekly visits, respectively).

In the first analysis just described, the intermediate group could hardly be distinguished from both other groups. Therefore, we repeated the discriminant analysis, this time without the children belonging to this intermediate group. Table 5 illustrates that this analysis does differentiate more saliently among both "extreme" groups (as testified by, among other things, the values of the canonical correlation and Wilks' Lambda). "Non-parental care" and "numer of overnight separations" are now clearly the most prominent variables, followed at a distance by "punishment by leaving alone", and the "chore factor". The mother's "attitude towards her husband's working part-time" has disappeared from the discriminant function. The rather strong contribution of "non-parental care" to the differentiation between "secure" and "insecure" children certainly supports the extension hypothesis. This interpretation is corroborated further by the second highest contributor, "number of overnight separations" (which, as we mentioned above, hardly correlates with "non-parental care"), a variable for which the secure group has a mean score more than twice as high as that of the insecure group (cf. Table 4)

Table 5
Hierarchical canonical discriminant analysis performed on two "extreme" groups: "insecure" (n=35) and "secure" (n=32) children

Variables	Discriminant coefficients	Structure coefficients
Non-parental care	.60	.68
Number of overnight separations	.53	.56
Punishment by leaving alone	-.38	-.42
Chore factor	.36	.37
Eigenvalue	.34	
Canonical correlation	.51	
Wilks' Lambda	.74	
p	.001	
Centroids	-.54 ("insecure")	.61 ("secure")

Finally, we performed a third discriminant analysis on the data of this second study. The rationale for this third analysis was based upon the results of the first validational study with the Perceived Security scale discussed earlier in this chapter. You will recall that the results of this validational study clearly suggested that Perceived Security scale-scores seem to differentiate more specifically between Ainsworth's B4-, and C-children on the one hand, and the remaining (sub)-groups on the other (i.e., the A-, and B1- to B3-children). The B4- and C-children had a considerably less "secure" score than the other groups, which seemed virtually indistinguishable with respect to Perceived Security. Thus, the scale does not seem to differentiate between the apparently unruffled behavior displayed by the ("avoidantly attached") A-children in stressful situations and the behavior of the ("securely attached") B1- to B3-children as displayed in similar situations, reflecting confidence in the attachment figure. On the other hand, the children from the "borderline" group B4 (characterized by Van IJzendoorn et al., 1985, as "dependently" attached, cf. Sagi et al., 1985), and the C-category ("resistantly attached") show much anxiety, protest behavior, or very passive behavior in separation situations, which are the very situations described by the Perceived Security scale. We call to mind that 13 of the 62 children involved in the first validational study (21%) belonged to this B4/C-category and were perceived as considerably less secure by their mothers. In light of these findings, a third discriminant analysis was performed on the "insecure" group (those children belonging to the "bottom" 25% on Perceived Security, *n*=35) versus the "rest", based on the assumption (which in view of the validational results seems plausible) that this "insecure" group would consist predominantly of B4/C-children. It seems likely that this very dichotomy of the Perceived Security score distribution should optimalize the discriminant validity of the differences to be found.

Table 6 gives the results of the analysis, and it can be seen that they partly confirm the results of borh preceding analyses: the B4/C-group (or "insecure" group) differs from the "rest" primarily by "non-parental care", followed at a distance by the "chore factor", two variables which also discriminated in the preceding analyses. Again, children belonging to the "insecure" B4/C-group score remarkably lower on "non-parental care" than the children from the "rest"-group (see the mean scores in Table 6). A somewhat more traditional task division with respect to traditionally "male" activities (in the opinion of the mothers of the "insecure" B4/C-children) is the other aspect on which the groups differ from one another. Although there is a difference between the means of both groups on "number of overnight separations" (6.7 and 9.6 for B4/C and the "rest", respectively), this variable did not contribute significantly to the discriminant function in this analysis.

The interest of this third analysis, however, lies more in the fact that in the analysis, two variables contributed to the differentiation between the groups which also played a role in the first study, i.e., "maternal involvement with child-rearing" and, to a lesser extent, the "interaction factor". The mean scores on "maternal involvement with child-rearing", the most important index for the rearing context's "qualitative density", show that mothers of the "insecure" B4/C-children are more strongly involved with child-rearing than the mothers of the "rest"-group children (we call to mind that a higher score on this variable indicates a more relativistic posture towards child-rearing), a result consonant with that found in the first study. As the mean scores testify, the results with respect to the "interaction factor" also coincide with those found in the first study. Again, the fathers of the "insecure" B4/C-group are perceived by their wives as playing a slightly more active role in the "interaction factor" domain than the fathers of the "rest"-group. Although the results presented in Table 6 indicate that the differences concerned are rather small, at the same time such a result seems at variance with the extension hypothesis, i.e., the role played

Table 6
Hierarchical canonical discriminant analysis performed on the "B4/C-group" (n=35) versus the "rest" (n=100)

Variables	Discriminant coefficients	Structure coefficients	Mean scores B4/C group	Mean scores "rest" group
Non-parental care	.60	.72	6.0	11.0
Chore factor	.44	.71	6.6	7.8
Maternal involvement with child-rearing	.42	.45	26.2	28.1
Interaction factor	.29	.24	9.1	9.4
Eigenvalue	.11			
Canonical correlation	.32			
Wilks' Lambda	.90			
p	.009			
Centroids			-.56	.19

by the father in extending the child's rearing context. In the following section, in which we will attempt to make a synthesis of the findings with respect to Perceived Security, we will return to this apparently inconsistent result.

EXTENSION OF THE CHILD'S REARING CONTEXT AND PERCEIVED SECURITY: A TENTATIVE SYNTHESIS

Once again, it should be emphasized that results based on parent-report measures cannot yield complete and accurate descriptions, let alone conclusive evidence, with respect to the complex relationships existing between quantitative and qualitative aspects of the child's rearing context on the one hand, and the child's Perceived Security on the other. So whatever statements will be made regarding these relationships, they can only be of a preliminary nature.

Yet, comparing the results of both empirical studies shows that the greater part of the relationships found has proved able to stand up against variations in analytic techniques and operationalization strategies. Undoubtedly, the most important result is that in both studies our expectation regarding the existence of a positive relationship between the rearing context's "quantitative density" and Perceived Security was confirmed. In the first study, multiple regression results gave evidence of a significant and positive relationship between "maternal employment" and Perceived Security, while in the second study a closely related aspect, "non-parental care" was found to contribute significantly to a differentiation between "secure" and "insecure" groups (compiled on the basis of their Perceived Security scores) in all three discriminant analyses performed. Furthermore, "number of overnight separations", another aspect of the rearing context's quantitative density, differentiated significantly between "secure" and "insecure" groups in the second study (as opposed to the results of the first; but, at that time, "overnight separations" also included "number of hospital stays", a variable more likely to exert a negative influence on young children's "Perceived Security" cf. Löschenkohl, 1981).

Another important aspect of the extension hypothesis, the rearing context's "qualitative density", also proved to be related to the child's Perceived Security in the expected direction. Mothers characterized by a relatively strong "involvement with child-rearing" perceived their children as less secure in potentially threatening everyday life situations when compared to mothers with a more relativistic or "distant" attitude towards child-rearing. This result was found in both studies, although in the second study "maternal involvement" made a significant contribution only in the third discriminant analysis (cf. Table 6). It may well be that a more convincing outcome could be obtained with the help of a more direct data collection method such as observation. In that case, the gap between attitude and actual behavior might successfully be bridged. This of course holds much less for the various operationalizations of the rearing context's "quantitative density", such as "non-parental care" or "number of overnight separations", for which the mothers were asked to produce *actual* data concerning their children's contacts and whereabouts.

In both studies, a number of variables directly or indirectly related to the role of the father in extending the child's rearing context at times showed more or less unexpected relationships with Perceived Security. As a case in point we mention the finding that fathers who were *less* active (in their wives' opinion, that is) in the "interaction factor" domain (fathers contributing less to activities like "reading to the children", "tussling", "cuddling", etc.), seemed to have children with higher Perceived Security scores. The mean score for the various groups as presented in Table 6 illustrate, however, that the differences concerned are rather small.

As contrasted with the first study, the results of the second study revealed another aspect of the father's family role to be of some relevance, namely the spouses' task division concerning traditionally "male" activities, i.e., those belonging to the "chore factor" (e.g., "fixing a flat (bicycle) tire", "changing a fuse", etc.). From all discriminant analyses performed in this study it was apparent that a less traditional task division in this area (that is, a greater participation on the part of the wife) was associated with higher scores on Perceived Security.

The discriminant analysis performed on three groups (cf. Table 4) further revealed that a third variable (more indirectly) related to the father's family role, the wife's "attitude towards her husband's working part-time", yielded results consonant with those found in the first study. Mothers of the "secure" children (i.e., the "top" 25% on the Perceived Security scale) indicated that they value their "husband's working part-time" somewhat less highly than the mothers of the other children (in this case, too, it concerned rather small differences, cf. Table 4). Two explanations are possible: (1) it may well be that to the mothers of "secure" children, the fathers in these families already did participate rather actively in child-rearing tasks; (2) these mothers more or less "endorse" the view of Parke, cited earlier in this chapter, that "... increased father participation may cause conflict and disruption and threaten well-established and satisfying role definitions". As for the seemingly "inconsistent" results with respect to the "interaction factor" and the mother's "attitude towards her husband's working part-time", the reader is referred to the post-hoc analysis performed on the results of the first study, which suggested that children attached to *both* parents (that is, not exclusively to the mother) do have fathers who are more active in the "interaction factor" domain and also score higher on Perceived Security. We assume this result to hold for the second study as well since its sample consisted, with a few exceptions, of a subset from the one used in the first study.

Finally, the results of the second study suggested that parental punishment behavior was associated with the difference between "secure" and "insecure" groups (cf. Tables 4 and 5), a result not found in the first study. Although parents seem, in general, to punish their children rather infrequently by "leaving them alone", this punishment seemed to occur slightly more often in the "secure" group than in the "insecure" group. Slight as the difference may be, such a finding seems at variance with Bowlby's view that punishing by (a threat to) separation renders a child less confident of the caregivers' accessibility in case of need and is therefore conducive to the development of insecure attachment relationships. To the best of our knowledge, this somewhat puzzling result has not been found before, so that it seems very premature to attach too much value to it; in any case, the results are not strong enough to invalidate Bowlby's point of view. It may well be that such punishment is used more frequently with "secure" children simply because they are better able to cope with it. It should be emphasized that the use of parent-report questionnaires in this very case prevents us from making a more conclusive judgment on this matter; admitting to the use of punishment may well be liable to "social desirability", tendencies conducive to disguising a sometimes painful reality (due, for instance, to a social taboo on the use of punishment in bringing up children). Bowlby, for example, assumes threats of separation in particular to be as wide-spread as they are concealed. At any rate, punishment behavior seems a phenomenon which is very difficult to operationalize. Even, for that matter, with the help of observational techniques, because, in that case too, the researcher's or the camera's presence will probably result in the suppression of socially undesirable behavior. We are dealing then with a methodological problem that is as interesting as it is complex.

Before concluding this chapter we will briefly dwell on a third study, the results of which will be reported elsewhere. For this third study we used an entirely different sample, consisting of 384 families; the data were collected between May and September of 1982. At the moment these data are being analyzed with the help of LISREL to assess the goodness-of-fit of several different models describing the relationships between Perceived Security and a number of independent variables, these models being further refined versions of the original model as presented in Figure 1. It is interesting to note that the results of a number of preliminary analyses performed on these data largely confirm the picture presented thus far. As a case in point we will briefly describe the results of a discriminant analysis performed on two groups of children, compiled on the basis of their Perceived Security scores (the "bottom" 25% and the "top" 25%, cf. Table 5). This analysis clearly shows that, again, these groups are maximally separated by, among other things, "non-parental care" and "number of overnight separations". The "insecure" children spent on the average 7.1 hours a week in non-parental care, whereas for the "secure" group the mean score was 11.8 hours a week. As for the "number of overnight separations", the mean scores for the "insecure" and the "secure" groups are 9.1 and 16.1, respectively. It should be added that these results, based on the mothers' responses, are highly consonant with those based on the fathers' responses, which were analyzed separately. Furthermore, the results of the other discriminant analyses (similar to those discussed in Tables 4 and 6) all point in the same direction. In the near future, we will present a more detailed account of the results of the LISREL analysis as well as some of the more interesting preliminary analyses (Bakker & Tavecchio, in prep.).

In summary, it may be concluded that an extension of the child's rearing context (both quantitatively and qualitatively) seems to be associated with a higher degree of Perceived Security of children in potentially threatening everyday life situations. At the same time, however, it should be emphasized that the relationships found are not (yet) impressive; only when comparing two rather "extreme" groups (as compiled on the basis of their scores on Perceived Security), do the discriminating variables explain about 25% of the variance of the differences between these groups (cf. Table 5). As for the rest, the proportions of explained variance range from about 10% to 15% in the various studies. The relationships that were found do, however, stand up against variations in sample, operationalization strategies, and analytic techniques. On the other hand, they do not supply information about the *way* in which parents and children *experience* an extension of the rearing context. Establishing the fact that increasing the child's contacts with other persons than its parents does not necessarily result in a decrease of the child's Perceived Security does, however, make clear that an exclusive mother-child bond is not a necessary condition for the development of a secure attachment relationship.

Future research efforts will have to focus on the nature and the quality of children's relationships with several different persons outside the family. In our view, the child's experience of these contacts (with nurseries and day care centers, or with neigbors, relatives, friends or baby-sitters) is at least as important as assessing or measuring their frequency and duration.

Notes:

1. This chapter is partly based on previous publications which include the following:
   - Tavecchio, L.W.C., & Van IJzendoorn, M.H. (1982). Dichtheid van het opvoedingsmilieu en attachment: Een vooronderzoek [Density of the rearing context and attachment: A pilot study]. *Pedagogische Studiën, 59*, 1-15.
   - Tavecchio, L.W.C., Van IJzendoorn, M.H., & Hubbard, F.O.A. (1983). Dichtheid van het opvoedingsmilieu en waargenomen veiligheid: Een tweede vooronderzoek [Density of the rearing context and perceived security: A second pilot study]. *Kind en Adolescent, 4*, 45-68.
   - Tavecchio, L.W.C., Van IJzendoorn, M.H., Goossens, F.A., & Vergeer, M.M. (1983). Initiatief tot validering van aspecten uit de Bowlby-Ainsworth gehechtheidstheorie: De Strange Situation vergeleken met "Waargenomen Veiligheid" [Validation of aspects of the Bowlby-Ainsworth attachment theory: The Strange Situation and "Perceived Security" compared]. In P.J.D. Drenth, W. Koops, J.F. Orlebeke & R.J. Takens (Eds.), *Psychologie in Nederland. Enkele ontwikkelingen in 1982* (pp.246-262) [Psychology in the Netherlands. Some developments in 1982]. Lisse: Swets & Zeitlinger.
   - Tavecchio, L.W.C., & Van IJzendoorn, M.H. (1985). Discriminante validiteit van schalen voor Temperament en Waargenomen Veiligheid [Discriminant validity of scales for Temperament and Perceived Security]. *Gedrag. Tijdschrift voor Psychologie, 13* (3/4), 79-95.

2. It should be noted that given the subject-matter of these four studies (i.e., the children's Perceived Security,

their (perceived) Temperament, the children's contacts and whereabouts, etc.), mothers will, in general, be better informed about these matters than the fathers. Therefore, these studies' data are based primarily on the answers of the *mothers* to the various questions asked, a choice made mainly for the sake of the validity of the data to be used in the analyses. It should not be taken to mean that we are not interested in the fathers' point of view regarding these matters. Elsewhere, we reported extensively on the opinions of both parents concerning the division of family tasks between the spouses (cf. Tavecchio, Van IJzendoorn, Goossens, & Vergeer, 1983; 1984). Moreover, in a third "extension hypothesis" study, reported on in brief at the end of this chapter (to be reported on at greater length in the near future, cf. Bakker & Tavecchio, in prep.), we will explicitly compare the answers as given by both parents. In that study, it will be examined to what extent taking the "family" as the unit of analysis leads to different (or "better") results than the "traditional" choice, which prefers the maternal point of view regarding matters having to do with early childhood (research).

In writing this chapter, we chose to first present the results of both validational studies to allow the reader to evaluate the validity of the Perceived Security scale as used in both "extension hypothesis" studies. Actually, the first validational study was conducted after the conclusion of the first "extension hypothesis" study and ran parallel to the second one, while the second validational study is the latest of the four studies reported on. This means that the order in which the studies are presented is "logical" rather than chronological.

3. Repeating the various multiple regressions *without* "Adaptability" shows "Crying/Easy-Difficult" to be the "best" predictor of Perceived Security among the remaining temperamental dimensions, followed at a distance by "Persistent". With respect to "Crying/Easy-Difficult", this result is consonant with the (bivariate) correlations between this dimension and Perceived Security (ranging from -.23 to -.42 in the various groups); these correlations lag far behind those found between "Adaptability" and Perceived Security (with values ranging between -.58 and -.73). On the other hand, "Persistent" shows the lowest (bivariate) correlations with Perceived Security (between .09 and .18), but in the regressions *without* "Adaptability" it always ranks second after "Crying/Easy-Difficult". "Mood", showing (bivariate) correlations between -.21 and -.30 with Perceived Security, does not play a role of any importance multivariately.

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APPENDIX

Perceived Security Items[1]

1. How frightened is your child usually in surroundings unfamiliar to it? (1 = very frightened; 2 = somewhat frightened; 3 = a little frightened; 4 = not at all frightened); a, b, c, d.

2. Can you indicate how frightened your child usually is of being alone? (cf. item 1); a, b, c, d.

*3. Does your child move freely in unfamiliar surroundings?[2] (1 = very freely; 2 = somewhat freely; 3 = not very freely; 4 = not at all freely); a, b, c, d.

*4. How shy is your child usually with strangers visiting you at home? (1 = not shy at all; 2 = not particularly shy; 3 = somewhat shy; 4 = very shy); a, b, c, d.

5. How often is your child frightened? (1 = very often; 2 = fairly often; 3 = occasionally; 4 = (hardly) ever); a, b, c, d.

*6. Imagine that you and your partner take a few days holiday. During this time, your child stays with friends. Would your child be homesick? (1 = not at all; 2 = a little; 3 = considerably; 4 = a great deal); a, b, c, d.

7. How unpleasant does your child find it to be left alone in surroundings unfamiliar to it? (1 = very unpleasant; 2 = somewhat unpleasant; 3 = makes no difference; 4 = not particularly unpleasant); a, b, c, d.

*8. How quickly does your child usually feel at ease with strangers visiting you at home? (1 = immediately; 2 = after 5 minutes; 3 = after 15 minutes; 4 = after an hour; 5 = not at all); a, b, d.

*9. Does your child enjoy being left alone for half an hour with a visitor it does not know? (1 = very much; 2 = somewhat; 3 = makes no difference; 4 = not very much; 5 = not at all); a, b, d.

*10. Is your child out of sorts when you return after having been absent for half an hour? (1 = no change noticeable;

2 = a little change noticeable; 3 = change rather noticeable; 4 = change very noticeable); a, b.

*11. Is your child out of sorts when you return after an absence of an hour or two? (cf. item 10); a, b.

*12. Is your child out of sorts when you return after a day's absence? (cf. items 10 and 11); a, b.

13. Imagine that your child is in the living room and you are busy in the kitchen. Imagine further that there is a door between the kitchen and the living room. This door is closed. How often would your child try to get your attention by approaching you, crying, yelling, etc.? (1 = very often; 2 = fairly often; 3 = occasionally; 4 = (hardly) ever); c, d.

14. Can you indicate how frightened your child usually is of the dark? (cf. item 1); c.

15. How often did your child cry during its first year? (1 = very often; 2 = fairly often; 3 = little); c.

[1] After each item we have indicated in which of the various studies reported on in this chapter that item formed part of the Perceived Security scale:

a = items used in the first validational study;
b = items used in the second validational study;
c = items used in the first "extension hypothesis" study;
d = items used in the second "extension hypothesis" study.

[2] In the second validational study, item 3 was split up in two versions, both of them forming part of the Perceived Security scale used in that study:

- Does your child move freely in unfamiliar surroundings when you are present?
- Does your child move freely in unfamiliar surroundings when you are not present?

* items to be recoded

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CHAPTER 3

FACTORS AFFECTING THE DEVELOPMENT OF CAREGIVER-INFANT RELATIONSHIPS

Peter K. Smith and Rodney Noble

ABSTRACT

72 infants aged about 15 months were visited for 15 three-hour sessions by one of six caregivers. Records were kept of the infants' behavior while in her sole care. Most infants settled reasonably well with the caregiver. They greeted her positively on arrival, maintained a neutral or positive mood most of the time, and enjoyed stimulating games which she initiated. A small minority of infants did not settle so well. Ease of settling was not affected by sex of infant, but some relationships were found with attachment type to mother, infant temperament, previous separation experience, and frequency of visits. The theoretical and practical implications of these results are discussed.

INTRODUCTION

Usually, it is the infant's parents who have the major responsibility for their care in the early years; and the mother is characteristically viewed as the primary caregiver. Indeed, the early formulations of attachment theory (Bowlby, 1953) tended to view the mother as the only attachment figure for the young child. Influenced by this and by prevailing cultural stereotypes, most research on early social development, carried out in the 1960's and early 1970's, focussed narrowly on the mother-infant dyad. This was first rectified by consideration of the role of the father. Several studies, and notably the work of Lamb (1976) established the important influence and distinctive style of the father-infant relationship. Several commentators also stressed the wider social network of the infant in the family (e.g., Kreppner, Paulsen & Schütze, 1982).

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However, studies of infants' relationships with non-parental caregivers were slow to emerge. Up to the mid 1970's, infants had been characterized as responding fearfully to any strange person after 9 months of age. Although the concept of stranger wariness still retains some validity (Sroufe, 1977), it has been tempered by a recognition that infants in natural or infant-controlled settings often show friendly, affiliative responses to new adults (Bretherton & Ainsworth, 1974; Horner, 1980). From this assumption, it is possible to consider the development of non-parental, caregiver-infant relationships. Yet, very little research has been done on this. Perhaps the earliest relevant report is that of Ricciutti (1974) on changes in caregiver-infant relations. Bretherton (1978), and Smith, Eaton and Hindmarch (1981) showed that 1 and 2 year old infants became more relaxed with a new adult within a session, and over successive sessions. None of these studies was on a very large scale, however, and none examined the influence of other factors which might affect the success of new adult-infant relationships. In the last few years, several theoretical and empirical researches have suggested the likely importance of such factors. These will be reviewed shortly. First we consider the relevance of considering non-parental caregiver-infant relationships in contemporary society.

CONTEMPORARY RELEVANCE: BABY-SITTERS AND CHILDMINDERS

While parents are usually the primary caregivers for young infants, they are seldom the sole caregivers. In a cross-cultural survey, Weisner and Gallimore (1977) documented that mothers were the almost exclusive caregivers of infants in only 3% of societies, and the predominant caregiver in only 60%. In Britain, some degree of shared care with non-parents is also common, even when the mother is not working. In a sample of London working class homes, Tizard and Tizard (1971) found an average of over 4 caregivers for young children; in a study of non-working mothers in Sheffield, Smith and Turner (1981) found that some 1 to 3 non-maternal caregivers might be responsible for a 1 or 2 year old child for several hours a week. Besides older siblings, common non-parental caregivers are grandparents, aunts and uncles, and neighbors.

When both parents of a young child are working, the issue of non-parental care becomes more pressing. Many parents make use of babysitting arrangements in the child's home, although statistics are hard to come by. Other alternatives are for the child to be minded in someone else's home, or put in a creche or day nursery.

Day nursery places have long been inadequate for demand. During the mid 1970's, some 600,000 mothers of preschool children were engaged in paid employment in the U.K. (and at that time most fathers were working full-time). Some 50,000 childminders were registered nationally. However, unregistered (illegal) childminding has been estimated as 2 to 3 times as frequent (Tizard, 1975; Jackson & Jackson, 1979). Thus, babysitting in the child's home, and minding in someone else's home occur for a substantial proportion of young children.

Virtually no research has been done on babysitting, and rather little on the effects of childminding. However, the research which has been carried out on childminding in the U.K. has produced some worrying conclusions. Two studies - one in London (Mayall & Petrie, 1977) and one in Oxfordshire (Bryant, Harris, & Newton, 1980) - found that children often did not seem to fare well when minded. Many appeared insecure in the minder's home, and scored below expectations on tests of language or cognitive ability. These were children with registered minders: such problems might be worse with unregistered minders, some of whom provide very poor conditions for their children (Jackson & Jackson, 1979). Indeed, these findings led Bruner (1980) to conclude that "the present practice of childminding will increase maladjustment in the generation exposed to it". Such conclusions are weakened by the fact that the previous studies lacked good comparison data with non-minded children (Raven & Robb, 1980). Furthermore, recent studies in the U.S.A. have failed to find strong adverse effects of family-based day care (childminding), when compared directly with maternal care (Stith & Davis, 1984; Rubenstein, Pedersen, & Yarrow, 1977). Nevertheless, there is legitimate concern over whether childminding is providing a suitable social and cognitive environment for 1 and 2 year old children.

Why might there be such problems with childminding (and, by implication, possibly with babysitting in the child's home)? One undoubted factor is that many minders are untrained, and sometimes have poor facilities and inadequate support. Registration provides little benefit for them. The work of the Jacksons (1979) and others has indicated the value of training courses for childminders, and of social support and increased facilities. Nevertheless, the available evidence suggests that this is not the only issue.

Another important aspect is the relationship of the infant to the minder or sitter. Attachment theorists such as Bowlby would argue that the infant would be insecure and inhibited in the presence of an adult who was not, and could not become, an attachment figure. This view is widely regarded as extreme in its implications (Smith, 1980; Rutter, 1981). As we have seen, relationships with new caregivers can develop. Nevertheless, we know little about how this process occurs, how long it takes for a child to feel secure with a new person, and what other factors affect this. Such knowledge would be highly relevant to considering the emotional impact on the infant of childminding and babysitting arrangements.

In the next section we review recent research pointing to certain factors as being important to consider in this connection.

LIKELY FACTORS AFFECTING THE DEVELOPMENT OF NEW CAREGIVER-INFANT RELATIONSHIPS

From previous theory and research, four factors appear to be especially likely external influences on the development of a new relationship between an infant and a caregiver. These are (1) the quality of mother (or parent) - infant attachment, (2) infant temperament, (3) previous experience by the infant of separations and shared care, and (4) the frequency of sessions with the caregiver.

(1) Quality of parent-infant attachment

The quality of infant attachment to a caregiver is usually assessed by the Strange Situation (Ainsworth, Blehar, Waters, and Wall, 1978). This involves observation of the infant's reactions to arrivals and departures of the mother, and an unfamiliar adult (the "stranger"), in a laboratory setting. The characteristics of the infants' response enables the mother-infant relationship to be classified as avoidant (A1 or A2), secure (B1, B2, B3 or B4), or ambivalent (C1 or C2), with either A or C type relationships being considered "insecure". Theoretically, an insecure primary attachment relationship (e.g., to the mother) could be expected to predict to problems in other social relationships (Waters, Wippman, & Sroufe, 1978; Easterbrooks & Lamb, 1979), including new relationships with a caregiver. This prediction is contraindicated by findings that attachment relationships to mother, and father, are largely independent (Main & Weston, 1981; Lamb, Hwang, Frodi, & Frodi, 1982).

A few studies have directly examined the relationship between the quality of parent-infant attachment, and sociability with a stranger. Main and Weston (1981) obtained results suggesting that infants securely attached to mother, or father, were more likely to respond or relate in a friendly way to adults outside the Strange Situation. Lamb et al. (1982), however, found no relationship of stranger sociability to mother-infant attachment type, but did find that it related to secure attachment with fathers, especially B1 and B2 relationships. This was in a Swedish sample. Thompson and Lamb (1983), by contrast, did relate mother-infant attachment to stranger sociability; again, B1 and B2 relationships predicted friendly stranger interaction.

These results are not entirely consistent, but they all suggest some connection of parent-infant attachment to stranger sociability. A connection to ease of forming new social relationships is thus likely. The clearest prediction is that this would be easiest for infants who have a B1 or B2 relationship with their primary caregiver. B1 and B2 babies differ from B3 and B4 babies in being responsive to the mother, but less concerned to seek immediate proximity and contact after separation.

For some time the Strange Situation assessment was used somewhat uncritically. Lamb, Thompson, Gardner, Charnov, and Estes (1984) have since criticized a number of aspects of the Strange Situation procedure. Nevertheless, attachment type can be assessed reliably, and a recent volume (Bretherton & Waters, 1985) attests to its continuing fruitfulness as a research concept. However, while the debate continues, it may be more appropriate if links between attachment type, and other variables such as ease of forming a new relationship, are regarded as a validation of the Strange Situation procedure as much as a prediction made on firm grounds of established theory.

(2) Infant temperament

The most widely used description of temperament is that provided by Thomas, Chess, Birch, Hertzig, and Korn (1963; Thomas & Chess, 1977). These workers describe temperament in terms of nine dimensions based on retrospective analysis of mother's descriptions of their children's behavior, obtained in the course of the New York Longitudinal Study. The dimensions are: Activity level; Regularity or Rhythmicity; Adaptability to change in routine; Approach/withdrawal or Response to new situations; Level of sensory threshold/Threshold of responsiveness; Intensity of response; Positive or negative mood; Distractability; and Attention span/Persistence. Since the original description of these dimensions by Thomas et al.

(1963), they have been used as the basis for questionnaire methods of assessing temperament, for example the Infant Temperament Questionnaire (Carey & McDevitt, 1978).

Several studies have related dimensions of temperament to observable responses of infants to the approach or presence of strangers, or "stranger sociability". The most obvious dimension from the original Thomas et al. study is that of approach/ withdrawal. However, Scarr and Salapatek (1970) found that activity, adaptability, positive mood and high threshold of response were also associated with stranger sociability. Stevenson and Leavitt (1980) used the Infant Temperament Questionnaire and found that, as well as approach/withdrawal, distractability and (in contrast to Scarr & Salapatek), low activity were related to stranger sociability. Thompson and Lamb (1982) used the Rothbart (1981) Infant Behavior Questionnaire; this contains six dimensions of temperament (activity level, distress to limitations, duration of orienting, soothability, fear, smiling/laughter). The dimension of fear, which is similar to that of approach/withdrawal, was negatively related to stranger sociability at both 12 and 19 months, with other correlations also present in the older age group. Finally, Berberian and Snyder (1982) found a pattern of increasing relationships between temperament measures (using the Infant Temperament Questionnaire), and behavior to strangers, over the period from 5 to 9 months. Clearly, stranger sociability can be related to temperament, more especially in older infants, although the pattern of results is not entirely consistent across studies.

Two problems should be mentioned in the use of temperament questionnaires. First, is temperament an innate or constitutional characteristic of individual children, as Thomas and Chess (1977) believe, or is it much more a product of the adult-child dyadic relationship? The latter view is suggested by a recent study on neonates (St. James-Roberts & Wolke, 1984), and by work using the ITQ (Vaughn, Taraldson, Crichton, & Egeland, 1981). Both suggest that a mother's view of her infant's temperament is influenced by her psychological state and by her cognitions about her child, and about the causes for his/her behavior. The second difficulty is that a mother may be more influenced in her responses by what a baby ought to be like, than how the baby actually behaves. Thomas and Chess (1977) feel this problem can be avoided in face-to-face interviews, but questionnaires are more rapidly administered and easily scored.

The importance of these problems can be partly assessed by obtaining independent ratings of temperament on the same children (as was done in this study). High concordance between different raters would tend to support the validity of the construct of child temperament, and the use of the questionnaire method.

(3) Previous experience of separations and shared care

A number of studies have attempted to relate stranger sociability to the amount of prior experience with non-familial caregivers, or experience of day care. Surprisingly, most studies have not established such relationships (see Thompson & Lamb, 1982, for an example and review). A cognitive-developmental approach would predict that prior separation experience would better prepare an infant for a new relationship; however, too much prior separation might make an infant insecure. One recent study has found results concordant with such expectations. Jacobson and Wille (1984) examined separation protest in 18 month old infants, in relation to amount of extrafamilial care. A curvilinear relationship was obtained: separation protest was highest for those with either minimal, or extensive, prior separation experience. Thus, despite the absence of direct support in some other studies, prior separation experience clearly deserves consideration as a possible variable affecting new relationships.

(4) Frequency of visits with caregiver

A relationship takes some time to build up. Smith (1980) suggested that infrequent caregiving sessions might make a satisfactory relationship more difficult to establish, since the infant would "forget" more about the new caregiver, and the behavior routines of that caregiver, between sessions, and thus feel less confident in the relationship. The caregiver might also feel less involved and committed if sessions are infrequent. There is little evidence on this point, but Smith and Turner (1981) did find that infants were reported by mothers to be less well settled with caregivers they saw less than once a month, compared with those they saw more frequently.

SUMMARY

There has been little research on the development of non-parental caregiver-infant relationships. Yet, non-parental care of young infants is prevalent, and there is concern about its effects. The current study was designed to assess the quality of caregiver-infant relationships over a period of time, and to consider the impact of relevant factors, especially the four factors detailed above.

METHOD

Overview of project design

The main study was carried out from October 1981 to October 1984. Seventy-two infants, aged about 15 months, took part in the project. Each mother-infant dyad had an initial interview, temperament questionnaire, and Strange Situation assessment. Each infant was then visited in his or her own home, on 15 occasions, by one of six caregivers or "sitters". Each visit lasted 3 hours, and visits were scheduled at once, or three times, per week. During each visit observational measures of the infant, first with the mother and then alone with the sitter, were obtained. Temperament questionnaires were given to the mother, father, and sitter, at the completion of the visits.

The subject pool was balanced for sex and frequency of visits, and it was attempted to balance for attachment type to mother, in order to facilitate the controlled analysis of these independent variables. Natural variation in temperament and in prior separation experience (from interview) also allowed analysis of these factors in relation to the dependent variables based on the observational data.

Subjects

Infant subjects were recruited continuously from January 1982 to March 1984. Notices about the project were placed in health clinics, nursery schools and toddler groups in both middle and working class areas of Sheffield. The parents were offered "free babysitting". Altogether 113 infants came to the Department for an initial interview and Strange Situation assessment, and for further information on the project. This larger sample has been used for some analyses inter-relating interview data, temperament, and attachment type. Only 72 of these infants took part in the final project, as we needed to balance subgroups for age, and sex. The subject characteristics for these infants are shown in Table 1. All the infants were aged about 12 to 15 months at the start of the sessions. This age was selected firstly because the great majority of infants were then able to walk, and secondly because "stranger wariness" is high at this age (Sroufe, 1977). The mean age at participation mid-point was 14 months, 3 weeks, with a range from 13 months 0 weeks to 17 months 0 weeks. The mean ages of all subgroup breakdowns (by sex, duration of visits, and major attachment type) were within one month of the overall mean.

Table 1
Characteristics of infants who took part in the full project (n=72)

SEX	Boys	36	Girls	36				
SIBLINGS	With siblings	42	No siblings	30				
SOCIAL CLASS	Upper/middle class	59	Intermediate/ working class	13				
DELIVERY	Normal delivery	45	Early/late/ complications	27				
HOSPITAL SEPARATION	No hospital separation	65	Hospital separation of at least 1 night	7				
ILLNESSES	No illness	60	Minor/major illness	12				
SEPARATION FROM PARENTS	No overnight separation	52	Separation from pa- of at least 1 night	20				
EXPERIENCE OF NON-PARENTAL CARE	None	8	Less than 3 hrs/month	12	Irregular 3 to 12 hrs/ month	14		
	Regular less than 3 hrs/week	12	3 to 9 hrs/ week	17	10 or more hrs/week	9		
ATTACHMENT TYPE	C1	C2	A1	A2	B1	B2	B3	B4
	1	1	7	9	6	16	28	4

In addition to the 72 final subjects, altogether 19 subjects were invited to participate in the sessions, but did not complete their 15 visits. In 9 cases, the infant was withdrawn before visits commenced, usually because mutually convenient visiting times could not be arranged with the sitter. In 10 cases, the parents withdrew from participation after visits had started. Judging from the parents' comments, 3 of these were due purely to timing problems, whilst 7 were problems of settling; in these latter, parents typically reported the infant as becoming upset at visits, or sleeping poorly, or more becoming clingy to mother. A comparison of the dropouts with the main sample failed to find any significant differences on the basis of interview data or attachment type (using chi-square tests) or temperament (using *t*-tests).

Caregivers/research assistants

The caregivers/research assistants were recruited through advertisements in local newspapers. Selection was made on the basis of ability to understand and cope with the nature and demands of observational studies of infants, and evidence of recent experience with, and ability to get on with, infants and their parents.

Six persons were appointed, all women, ranging in age from 30 to 42 years of age. Most had university degrees, had had young children of their own, and had some voluntary or professional experience with children. During training, the caregivers/research assistants were introduced to the nature of the project, and lists of provisional categories. The training then comprised three main stages: (1) videotapes of mother-infant interaction were viewed, and the definitions of categories and scoring jointly discussed. After a number of such sessions, provisional category lists were agreed upon. (2) Volunteer mothers with infants of about the right age, came to an observation room in the Psychology Department. Three such mother-infants dyads came, on different occasions. On each visit two caregivers practised interacting with the infant, while the others practised the observational categories live. Each session was also videotaped for later use. (3) Each of the three videotapes were comprehensively scored, and a master scoring sheet for each compiled. Final adjustments to and clarification of the categories, and their definitions, were made at this stage. These tapes were used to assess the reliability of scoring of the six caregivers/research assistants, both at the end of training, and at regular (approximately termly) intervals thereafter.

When reliability assessed by this method had reached satisfactory levels (in general, reliabilities exceeding 70 percent), each caregiver/research assistant made a full-scale practice visit to one of the mothers who had participated in the earlier training. No problems were found at this stage, so data collection commenced. The whole training period lasted about 3 months.

Interview data

Interviews were conducted whenever a parent came to the Psychology Department for a Strange Situation assessment. The interview schedule was designed to assess background variables which might be of importance. Summary data from the interview have been presented in Table 1. Together with the interview questions, the parent was told about the nature of the project, and the commitment involved. Assurances were given that individual data would be treated confidentially, and that anonymity of subjects would be preserved.

Temperament questionnaire

The Toddler Temperament Questionnaire (Fullard, McDevitt, & Carey, 1978) was used in this research. It is a widely used instrument, appropriate to this age-range. It was given to the parent (almost always the mother) at the time of the interview. For those infants who participated in the full project, both mother and father were given the same temperament questionnaire to fill in when visits were completed. They were asked to fill in the questionnaires independently. In addition, the caregiver who had visited an infant's house, was also asked to fill in the questionnaire at the completion of visits. The questionnaires were coded in the standard way, to give scores on each of the nine dimensions of temperament assessed by the instrument.

The Strange Situation assessment

The Strange Situation assessment lasted about 20 minutes, and followed closely the standard procedure detailed in Ainsworth et al. (1978). The mother and infant were shown into a playroom equipped with toys. (In two cases the father, as primary caregiver, accompanied the infant; thus in these cases father-infant attachment was assessed. Neither of these two infants was in the final project sample of 72.) The mother had previously been briefed by letter, and the experimenter went over the routine again on arrival. The standard seven episodes were then followed, with the whole sequence being filmed on videotape. One camera was sited in the playroom and remoted-controlled, the other was behind a one-way screen. The two images were combined on a split-screen monitor. This facilitated close observation of the infant, regardless of position.

Two "strangers" were employed, both female postgraduate students. Both received prior training, and the attachment typing of infants was not significantly related to which "stranger" was employed.

The videotaped sequences were scored for attachment type very soon after the visit. The Ainsworth et al. (1978) typing scheme was followed. These initial classifications were used as the basis for selection of children to the final sample; the latter containing equal numbers of "insecure" mother-infant dyads (A1, A2, C1, and C2), "secure" B1 and B2 dyads, and "secure" B3 and B4 dyads. It was found that "insecure "dyads occurred less frequently than the other major subgroups. Thus, at the end of the subject recruitment period, it became necessary to assign three rather "borderline" infants to the "insecure" category.

Toward the end of the project (August 1984), all the videotapes were scored again. This was done effectively blind to the previous scoring, which had been done from 4 to 32 months previously. A concordance of 85% was obtained. Where there was any disagreement, the tape was viewed again and a final decision reached. These are referred to as the "final" attachment types, and it is these which are given in Table 1 and throughout the results. They differ slightly from the "initial" attachment types, due to the "borderline" infants mentioned earlier, and to a greater number of dyads being rated as B3 or B4 in the final assessment.

Reliability of attachment typing was further assessed by having a sample of 20 dyads (selected randomly as being on 3 complete videotapes) scored blind by Dr. Kevin Browne from the University of Surrey. Dr. Browne had previously used the Ainsworth scheme in his own research. A concordance of over 80% was obtained.

Session details

Each infant-mother dyad was assigned one of the six caregivers, or "sitters". The sitter made an initial (usually evening) visit while the infant was asleep. Details of visit times were arranged, and essential routines and information were exchanged. Visits were scheduled either once, or three times, per week, each dyad being assigned to one or other schedule. Some latitude had to be allowed, due to sickness and holidays. Once a week dyads were expected to continue 15 weeks; the actual mean duration of visits was 13 weeks 4 days, with a range from 9 weeks 4 days to 17 weeks 0 days. Three times a week dyads were expected to continue 5 weeks; the actual mean duration of visits was 5 weeks 3 days, with a range from 4 weeks 0 days to 7 weeks 3 days. Thus, despite more variation than was planned for, there was no overlap of duration of visits between the two subgroups.

The 15 visits were scheduled for mornings or afternoons when the infant would normally be awake. The mother was asked to remain present and responsible for the infant during the

Table 2
Timetable of activities in each 3-hour session

	Activity	Data obtained
	Sitter arrives	Infant greeting of sitter
30 minutes	Mother present, sitter records behavior	Infant behavior, mother present
	Mother leaves	Infant separation from mother
30 minutes	Spontaneous sitter-infant interaction	
30 minutes	Sitter "busy", records behavior	Infant behavior, mother absent
30 minutes	Spontaneous sitter-infant interaction	
30 minutes	Sitter-interaction including "play probes" and tape-recorded interaction	Infant reaction to play probes
30 minutes	Spontaneous sitter-infant interaction	
	Mother returns	Infant greeting of mother
	Sitter leaves	Infant separation from sitter

first 30 minutes; the infant's behavior while she was present would serve as a comparison for the infant's behavior later when alone with the sitter. After 30 minutes the mother departed, and the sitter was responsible for the infant for a two-and-a-half hour period until the mother returned. During this time, the sitter went through a regular series of activities, detailed in Table 2. In particular, she recorded the infant's behavior at greetings and separations (usually on a small portable tape-recorder) when these occurred; and the infant's ongoing behavior first when mother was present, and second when mother was absent, using pen and paper schedules. On every third session, usually, a few "probes" (stimulating games) were carried out with the infant. Finally, on each session the tape-recorder was left on for a 30 minutes period to record the ongoing sitter-infant interaction.

Greetings and separations

The sitter recorded greeting or separation behavior at four points during each session (see Table 2). These were recorded in narrative form, after considerable practice and feedback during the training period. The narratives included emotional response and motor behavior, and were continued until the sitter judged that the greeting or separation was completed.

The narratives were scored using a six-point scale. The details of the scales are shown in Table 3. The scoring was done blind to attachment type, although it was not feasible to do it blind to sex, or session frequency. Scoring reliability (based on complete records for 3 children) was 94%.

Table 3
Coding scheme for greetings and separations

	GREETINGS	SEPARATIONS
6.	Seeks immediate close or physical contact - approaching person or asking for pickup (e.g., arms upraised). Could be lauging, or crying *before* pickup.	Laughs during departure and enters into immediate involvement with remaining person
5.	Smiles, waves, greets or "talks to" person, at a distance. (Can include a delayed approach.) (If picked up, does not protest at being put down.)	
4.	Child ignores, or watches but does not obviously respond to person arrival or departure. No marked mood change.	
3.	Clearly mixed or ambivalent behavior, characterized by approach/avoidance or by positive/negative mood swings to person e.g., smile but request pickup from another person	e.g., cry followed by wave or smile; smile followed by search
	negative to positive is 3a positive to negative is 3b	
2.	Some crying, or approach or clinging to third person; easily soothed.	Moderately upset, some protest or whining, some brief search for person.
1.	Prolonged or vigorous crying, run away or hide, demand pickup from third person and continues to show some upset after pickup.	Very upset, vigorous crying, prolonged search behavior, or tantrum.
0.	Not present at arrival.	Absent or ignorant of departure.

Subsequently, three measures were derived for further analysis. These were (a) the modal response for each kind of separation or greeting (ignoring zero scores), (b) the direction of change when comparing the second half to the first half of data (usually, last 7 to first 7 sessions, but compensating for zero entries), and (c) the proportion of entries scored as showing any ambivalent response, i.e., 3 on the rating scale.

Observational data

During the periods in which the sitter recorded the infant's behavior, either with the mother and sitter present or alone with the sitter, a number of predetermined categories were used. The final list contained: 5 categories of predominant activity by the infant (e.g., does nothing; joint activity); 22 categories of type of activity or toy played with by the infant (e.g., musical toy/bricks/listen to story); 28 categories of particular behaviors by infant, mother or sitter (e.g., ask for/request; comforting); and records of the occurrence of any vocalization by infant, or mother, or sitter to infant; of proximity of infant to mother or sitter; and of infant's mood on a 5-point scale. Analysis is continuing on this data, and only that for infant mood is presented in this report.

A scoresheet was designed for use by the sitters. One scoresheet covered one 30-minute recording session, broken up into 60 separate 30-second segments; near the end of each 30-second interval, the mood was noted down by the sitter. The 5-point scale was (1) very happy: laughs or giggles; (2) moderately happy: smiles, coos; (3) neutral: no particular expression or emotion; (4) mildly unhappy or cross: complains, sniffs, whines quietly, frown, pucker face; (5) very unhappy or upset: loud full crying, screaming or tantrum. The most extreme mood occurring (furthest from neutral) was scored for each interval.

The reliability of usage of these categories was assessed by using three master videotapes. Each sitter scored one of these tapes "blind", both at the end of training, and at regular intervals of 3 to 4 months through the project. Mean reliability for mood was 84%.

Probes

Approximately every third session, the sitter tried out one or a few "play probes" with the infant (see Table 2). These were vigorous or arousing games, which the mother had informed the sitter that the child enjoyed with her. The sitter recorded the infant's reaction afterwards in terms of the 5-point mood scale. Typical probes were peek-a-boo, swinging around, bouncing on knee. Previous research has indicated that such activities may not be enjoyed with a stranger, even when they are enjoyed with the mother (Sroufe, 1977). Thus, despite inevitable problems in standardizing the probes, they were felt to be a useful and valid indicator of the trust the infant was developing with the sitter.

The probes were subsequently scored for (a) whether the mean mood response increased or decreased after the median probe, (b) the percentage of probes resulting in a mood score of 1 (very happy; laughs or giggles) at some point, and (c) the percentage of probes resulting in a score of 4 or 5 (unhappy, cross or upset) at some point. Sufficient probe data for analysis was not obtained for 5 children, usually because the child was asleep, or not settled enough for the caregiver to consider it appropriate.

RESULTS

Attachment type

As already indicated, the attachment typing carried out on the basis of the Strange Situatioin yielded a rather greater proportion of securely attached babies than had been anticipated from previous research. The actual numbers in each attachment type have been given in Table 1. No previous study using attachment typing has (so far as we know) been published on U.K.-infants. Therefore it may be of interest to compare the distribution of attachment types we have obtained, to those in other countries. This comparison is made in Table 4, which is an extension of a table published by Miyake, Chen, and Campos (1985). Data from five other countries can be compared with our U.K. data (based on our total sample of n=113). The considerable cross-cultural variation in distribution of attachment types has already been noted (e.g., Bretherton & Waters, 1985), and has been a source of some controversy and also of some criticism of the concepts of "secure" (type B) and "insecure" (types A and C) attachment. Our data in fact produces the highest proportion of "securely attached" babies of all the national samples quoted. In general, our distribution is closest to the Swedish sample (from Lamb et al., 1982), and then to the U.S.A. sample, and least similar to the German and Israeli samples.

Table 4

Proportions of A, B, and C classifications of attachment type, in different countries. Adapted and extended from Miyake et al. (1985)

	A	B	C
U.K. (present project)	15.0	81.4	3.5
Japan	0	72.0	28.0
U.S.A.	23.0	62.0	15.0
Germany	49.0	32.7	12.2
Sweden	21.6	74.5	3.9
Israel	12.5	37.5	50.0

These comparisons must all be treated with considerable caution, as the basis of subject selection in the different studies is not always specified and may not be random. Our own subject pool is of course nonrandom, being a volunteer sample. This might well be expected to exaggerate the proportion of "securely attached" infants, if their mothers are more likely to volunteer for participation. Nevertheless, the largest proportion of our babies were in the B34 category (almost 50%), yet, as we subsequently found, these babies were the ones who, by some criteria and notably separation protest at mother's departure from the home, had most trouble settling and more so than the "insecurely attached" infants.

Temperament ratings

The correlations between mother ratings before and after her infants' participation can be taken as measures of reliability. The correlations are all highly significant; the range is from .44 to .73, with a mean of .64. The correlations between different raters (mother, father, sitter) at the same time can be taken as measures of validity, if one regards temperament as a primarily infant-based measure; or alternatively as measures of the similarity of various dyadic relationships which the infant has. By this latter criterion, mother-infant and father-infant are most similar (mean r of .48), then father-infant and sitter-infant (mean r of .33), and finally

Table 5
Modal responses at greetings and separations (n=72)

		Proximity, contact	Smile, wave	Ignore, watch	Mixed, ambivalent	Mild crying	Prolonged crying
GREETING TO	SITTER	4	*47*	10	4	5	2
	MOTHER	*54*	13	4	1	0	0
		Laugh	Smile, wave	Ignore, watch	Mixed, ambivalent	Mild crying	Prolonged crying
SEPARATION FROM	SITTER	0	*56*	15	0	0	1
	MOTHER	1	*19*	*17*	0	*19*	*16*

mother-infant and sitter-infant (mean *r* of .28). Thus, mother and sitter have least similar perceptions of the infant, with father in-between. Agreement is noticeably highest on the Approach/Withdrawal dimension. Fuller details of the temperament results will be presented in a subsequent publication.

Greetings and separations

Table 5 shows the modal responses at each greeting and separation, for each of the 72 infants in the main study. The commonest response is shown in italics. When the sitter arrived, the usual modal response (65%) was that the infant smiled, waved or otherwise greeted her. Some infants (14%) usually ignored her; and about 15% of infants responded modally with ambivalence, or crying. By contrast, when the mother arrived after being away for two-and-a-half hours, the usual modal response (75%) was that the infant approached her and sought physical contact (only 6% of infants similarly approached the sitter on arrival). 18% of infants contented themselves usually with just smiling, waving or greeting at a distance, while 7% usually ignored, watched, or showed mixed feelings. By this criterion, infants were (not surprisingly) much more attached to mother than to sitter, but nevertheless the usual reaction to the sitter's arrival was a positive one.

On the sitter's departure, 78% of infants modally smiled or waved again, while 21% modally ignored or just watched without overt mood change. On the mother's departure, however, the infants' behavior was much more varied. Altogether 49% modally showed some distress; just over half of these could usually be comforted quickly, just under half (22% of the whole sample) remained distressed for at least some minutes. Another 24%

ignored or just watched the mother leave, while altogether 28% smiled or waved, or seemed usually quite happy at mother's departure. However, these latter infants usually exhibited ambivalence at at least some of the separation from mother episodes. Fourteen of these 20 infants (70%) showed ambivalence on some occasion(s), whereas only 17 of the remaining 52 infants (33%) did so; the chi-square value of 8.2 is significant at the .005 level.

Table 6 shows the number of infants who showed positive or negative changes in response, over sessions; and who showed some ambivalence. Direction of change was taken as being positive if it moved up the scale on Table 3, and negative if it moved downward. Generally, about half the infants showed a tendency to become more "positive" or relaxed about the greetings and separations, over the 15 sessions, whereas about a third showed a tendency to become more "negative" or upset; a few showed no change.

Table 6
Changes in direction of response (over sessions), and number of episodes showing ambivalence, for greetings and separations (n=72)

		DIRECTION OF CHANGE, OVER SESSIONS (*n*=72)			AMBIVALENCE (*n*=72)		
		positive	no change	negative	none	low	high
GREETING TO	SITTER	38	5	29	23	31	18
	MOTHER	32	14	26	44	24	4
SEPARATION FROM	SITTER	31	16	25	44	21	7
	MOTHER	41	5	26	41	23	8

The presence of ambivalence was scored as "none" if ambivalence (score 3 in Table 3) was not scored for any of a child's episodes; "low" if it occurred in up to 20% of a child's scorable episodes; and "high" if it occurred in 20% or more of a child's scorable episodes (usually, 3 episodes or more). Ambivalence was highest at the sitter's arrival, with 43% showing low ambivalence and 25% high ambivalence; for the remaining encounters, some 60% of infants showed no ambivalence at all, with about a third of infants showing low ambivalence, but few showing high ambivalence.

The greeting and separation data was then further analyzed with respect to the main factors in the project design, viz., attachment type, duration of visits, sex, the data obtained from interview, and the temperament ratings. Chi-square analyses were used for this purpose, except for the temperament ratings where *t*-tests were used. Using Table 5 and 6 as a guide, the modal response was dichotomized into "negative" responses (scores, 1, 2, 3, and 4); or "positive" responses (scores 5 and 6). The direction of change was dichotomized into "better" (positive and no change), or "worse" (negative). The original three categories for ambivalence were retained, but when a high chi-square was obtained, the calculation was also carried out using just two ambivalence categories, summing "low" and "high" ambivalence together into "some" ambivalence. All significance levels greater than .05 are reported; there are 8 such results. Given the large number of analyses carried out, a couple of marginally significant findings might be expected by chance; only highly significant results, or those forming a pattern with other findings, should be treated with confidence.

Greetings/separations and attachment type

Altogether four of the twelve analyses are significant. Table 7 relates to the modal greeting of the sitter. From Table 5 it was seen that most infants were mildly positive at this encounter. However, Table 7 shows that the infants who were modally negative to the sitter, were almost always B34 infants ($p<.01$); Table 8 shows that the B34 infants were also those most likely to show some ambivalence at the sitter's arrival ($p<.05$).

Table 7
Contingency table of modal greeting to sitter, by attachment type

		Attachment type			
		AC	B12	B34	
Modal greeting to sitter	Neg (1-4)	1	4	16	$X^2(2)=12.86$, $p<.01$
	Pos (5-6)	17	18	16	

Table 8
Contingency table of ambivalence in greeting to sitter, by attachment type

		Attachment type			
		AC	B12	B34	
Ambivalence in greeting to sitter	None	10	8	5	$X^2(2)=8.73$, $p<.05$
	Some	8	14	27	

Table 9 shows a complementary pattern of ambivalence in relation to the greeting of the mother. Here, it is AC infants who are likely to be more ambivalent ($p<.05$); the B34 infants, most ambivalent at the sitter's arrival, are least ambivalent at the mother's arrival. Table 10 shows that in the separation from the sitter, the AC infants are least ambivalent ($p<.05$) (just as they were at the sitter's arrival, Table 8). There were no significant associations for the mother separation data.

Table 9
Contingency table of ambivalence in greeting to mother, by attachment type

		Attachment type			
		AC	B12	B34	
Ambivalence in greeting to mother	None	5	14	25	$X^2(2)=12.37$, $p<.05$
	Some	13	8	7	

Table 10
Contingency table of ambivalence in separation from sitter, by attachment type

		Attachment type			
		AC	B12	B34	
Ambivalence in separation from sitter	None	15	10	19	$X^2(2)=6.04$, $p<.05$
	Some	3	12	13	

The findings obtained relate closely to what would be expected, given the nature of the Strange Situation, and the crucial role of the reunion (greeting) episodes in the scoring of attachment type. AC infants are characterized by ambivalence to the mother at reunion in the Strange Situation, and they similarly show the most ambivalence in the naturally occurring mother greetings (Table 9). Conversely, B34 infants are characterized by distress and wariness of the stranger in the Strange Situation, and they are most negative and ambivalent in the naturally occurring sitter greetings (Tables 7 and 8). The scoring of greetings and separations was, of course, done totally separately from and blind to the attachment type of the infant; thus, these associations serve to validate the Strange Situation classification scheme as being representative of naturally occurring reunion behavior.

Greetings/separations and duration

Only one analysis proved significant. Table 11 shows that of the few infants who did not respond positively to the mother on reunion (they ignored or watched passively, or in one case was ambivalent, Table 5), all were experiencing 15 week visits. The effect is significant at the .05 level.

Table 11
Contingency table of modal greeting to mother, by duration of visits

		Duration of visits 5 wks	 15 wks	
Modal greeting to mother	Neg (1-4)	0	5	$X^2(1)=5.37$, $P<.05$
	Pos (5-6)	36	31	

Greetings/separations and sex

None of the analyses with sex proved significant. Boys and girls were very similar in their reactions to the greeting and separation episodes.

Greetings/Separations and interview data

Of the six sources of information coded from the interview (see Table 1), four yielded no significant associations with the greeting and separation data. These were the number of siblings, normal delivery or not, previous experience of hospital separation, and previous experience of illness. The remaining interview data yielded three significant associations. Two were on overnight separation from parents, and one was on non-parental care (reduced to 2 categories of more or less than 3 hrs/wk of non-parental care).

Table 12 shows the only significant association for separation from the mother; children who had experienced some previous separation from the mother, were much more likely to get "better" than "worse" over sessions ($p<.05$). Similarly, Table 13 shows that these children became "better" at separating from the sitter ($p<.05$). The data on non-parental care refers to shared care in daytime, rather than overnight separations. Table 14 shows that children who experienced more than 3 hrs/wk of non-parental care, respond more positively to the sitter's departure, smiling and waving rather than ignoring her ($p<.05$). These children were also more likely to be positive to the sitter's arrival and to the mother's arrival. Although the latter are trends of only marginal significance ($p<.10$), the findings are coherent, and make sense if previous

Table 12

Contingency table of change over sessions in separation from mother, by experience of separation from parents

		Separation from parents		
		None	Some	
Change in separation from mother	Worse	23	3	$X^2(1)=5.35$, $p<.05$
	Better	29	17	

Table 13

Contingency table of change over sessions in separation from sitter, by experience of separation from parents

		Separation from parents		
		None	Some	
Change in separation from sitter	Worse	22	3	$X^2(1)=4.75$, $p<.05$
	Better	30	17	

Table 14

Contingency table of modal separation from sitter, by amount of non-parental care

		Amount of non-parental care		
		<3hrs/wk	>3hrs/wk	
Modal separation from sitter	Neg (1-4)	14	2	$X^2(1)=4.97$ $p<.05$
	Pos (5-6)	32	24	

babysitting experience accustoms a child to the experience (as our own findings for direction of change over sessions also suggest, for most children: Table 6).

Greeting/separations and temperament

The greeting/separation data was related to the mothers' initial temperament ratings ($n=72$). Altogether 10 out of 108 analyses are significant; some 5 of these might be "significant" by chance. Further details of the significant results are given in Table 15.

At the sitter's arrival, infants rated higher on APP/W (more withdrawing), are indeed more negative to the sitter; they are also less likely to improve in their greeting to the sitter. Infants higher on PERS (less persistent) are also less likely to improve in this respect.

At the mother's departure, infants high on INT (more intense) are more likely to be negative. Ambivalence at mother's departure is more likely in infants low on RHY (more regular), low on APP/W (more approaching) and low on MOOD (more positive mood). Ambivalence at the sitter's departure is also more likely in infants low on MOOD (more positive mood). At mother's return, ambivalence is highest in infants low on ADAP (more adaptable), and low on MOOD (more positive mood).

The most reliable results here are probably those relating to APP/W, two of which are significant well beyond $p<.05$, and which fit in well with the relations previously obtained between temperament and attachment type, and greeting/separation and attachment type. It seems that infants rated as high on APP/W (withdrawing) are more likely to be B34 babies, and

Table 15
Means and significance levels for significant associations found between temperament ratings and categories of greeting and separation

(a)		MODAL RESPONSE		
		Neg. (1-4)	Pos. (5-6)	
GREETING TO SITTER		($n=21$)	($n=51$)	
	APP/W	3.27	2.36	$F=3.68$, $p<.001$
SEPARATION FROM MOTHER		($n=52$)	($n=20$)	
	INT	3.97	3.42	$F=3.02$, $p<.004$
(b)		DIRECTION OF CHANGE		
		Worse	Better	
GREETING TO SITTER		($n=29$)	($n=43$)	
	APP/W	2.93	2.42	$F=2.14$, $p<.04$
	PERS	4.62	4.12	$F=2.43$, $p<.02$
(c)		AMBIVALENCE		
		None	Some	
GREETING TO MOTHER		($n=44$)	($n=28$)	
	ADAP	3.87	3.43	$F=2.60$, $p<.02$
	MOOD	3.26	2.84	$F=2.77$, $p<.007$
SEPARATION FROM SITTER		($n=44$)	($n=28$)	
	MOOD	3.22	2.91	$F=2.02$, $p<.05$
SEPARATION FROM MOTHER		($n=41$)	($n=31$)	
	RHY	2.75	2.40	$F=2.02$, $p<.05$
	APP/W	2.92	2.23	$F=2.93$, $p<.005$
	MOOD	3.24	2.92	$F=2.12$, $p<.04$

more likely to show distress at the sitter's arrival. There are also some consistent findings for MOOD, one significant well beyond $p<.05$, which suggest that more positive mood goes with the presence of some ambivalence at mother's departure, mother's arrival, and sitter's departure. However, the reason for this finding is not so clear as that for APP/W.

Probes

The summary results for the probe data are shown in Table 16. The first measure used was of the change in mood before and after the median probe. Overall, about two-thirds of the children became more positive to the probes, and about one-third became more negative. Boys and girls did not differ significantly. However, the positive trend was more marked in the 15 week infants, and the negative trend more marked in the 5 week infants. If the "up" and "equal" numbers are combined, and similarly the "insufficient data" and "down" numbers are combined, the difference is significant with a chi-square value of 4.96 (df=1), $p<.05$. The three attachment types do not differ significantly, the corresponding chi-square value being 3.77 (df=2), n.s.

The second measure was of the percentage of probes in which a positive mood (mood 1) occurred. Overall, 54 percent of probes were positive by this criterion. The differences among subgroups are clearly small; a one-way analysis of variance was carried out for attachment type, yielding an F value of 1.01 (df=2,64), n.s.

Tabel 16
Summary of results from probes, showing change in mood; percent of probes with positive mood; and percent of probes with negative mood

		BOYS (n=36)	GIRLS (n=36)	15WK (n=36)	5WK (n=36)	B12 (n=22)	B34 (n=32)	AC (n=18)	WHOLE SAMPLE (n=72)
CHANGE	UP	20	21	25	16	14	16	11	41
	EQUAL	4	2	3	3	1	3	2	6
	ID	2	3	2	3	1	3	1	5
	DOWN	10	10	6	14	6	10	4	20
PERCENT	POS	55	52	54	53	59	48	56	54
PERCENT	NEG	12	14	10	16	15	12	13	13

Note. UP = becoming more positive;
EQUAL = no change;
ID = insufficient data;
DOWN = becoming more negative.

The third measure was of the percentage of probes in which any negative mood (mood 4 or 5) was encountered. Overall, only 13 percent of probes were negative by this criterion (and most showed mood 4 rather than mood 5). Subgroup differences were again small. An independent groups t-test between 15 week and 5 week infants gave a t-value of 1.60 (df=65), n.s.

In summary, the majority of probes were well received by the infants, and few were disliked. For about two-thirds of the sample, they grew to like them more rather than less. Boys and girls scarcely differed at all. A small tendency for B34 children to be less positive is not significant. However, 15 week babies did become more positive significantly more than 5 week babies, as well as showing a non-significant trend to have fewer negative reactions.

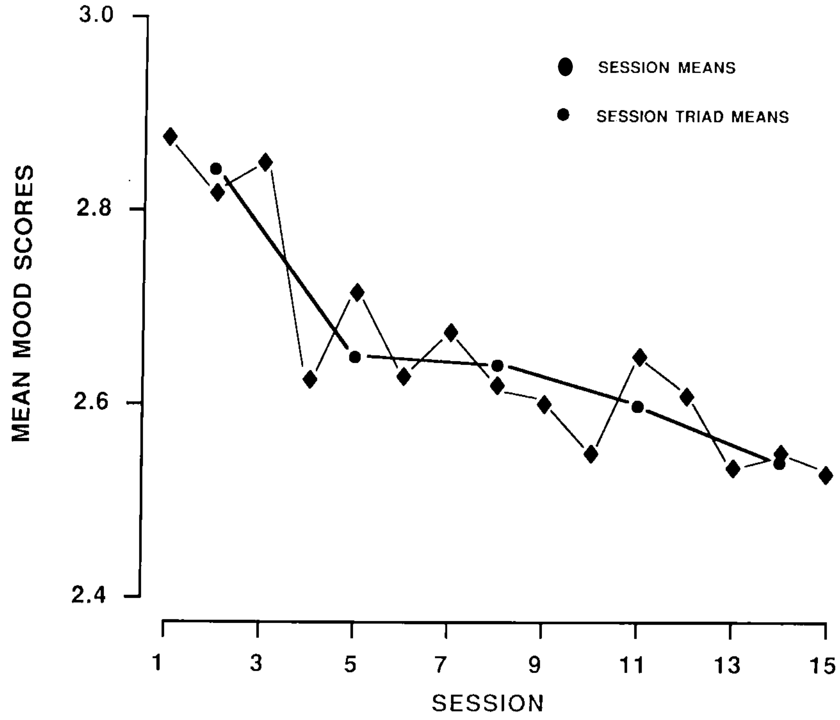

Figure 1. Variations in mean mood score with sitter, by session

Analysis of mood with sitter

For some children, incomplete records of mood were obtained due to uncontrollable occurrences such as the child falling asleep, being unwell, or being sufficiently upset that the sitter could not obtain normal records. We have not entered mood state into analysis unless at least 70% of total expected data was available. This resulted in an effective *n* of 55 for this analysis.

From analysis of variance, the main effects of duration, sex and attachment type, and their interactions, were all non-significant. However, a highly significant effect was found for session number, together with more modest but significant effects for four interactions with session number.

Figure 1 illustrates the main effect of session number, $F=5.15$, $p<.001$. Mean mood score steadily declines over sessions, especially over the first three or four sessions. Mood score 3 is neutral, while 2 is positive/smiling. Thus, the trend is from predominantly neutral to more relaxed, positive mood as session numbers progress.

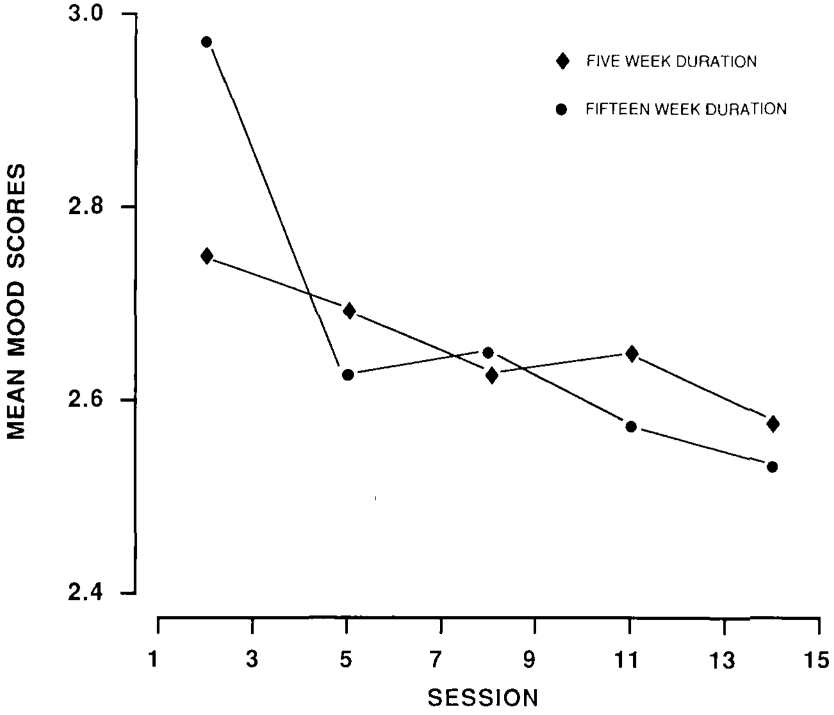

Figure 2. Variations in mean mood score with sitter, by session triad and duration

Figure 2 shows the interaction of duration with session number, $F=1.75$, $p<.05$. It can be seen that the only appreciable difference is in the early sessions. Infants experiencing the once per week, 15 week duration condition take a bit longer to settle down to a more relaxed overall mood; but there is no difference after some four or five sessions.

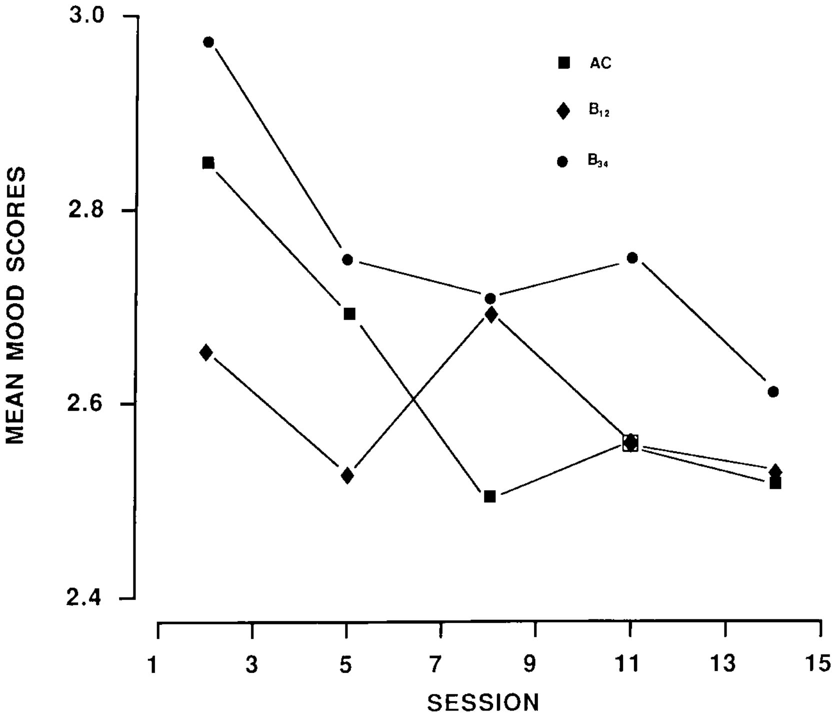

Figure 3. Variations in mean mood score with sitter, by session triad and attachment type

Figure 3 shows the interaction of attachment type with session number, *F*=1.66, *p*<.02. B34 infants are slowest to settle in to a more relaxed mood. B12 infants are fastest, with AC infants intermediate. There is a further interaction here with duration, *F*=1.52, *p*<.05; B34 infants are less happy early on, irrespective of duration, whereas AC infants are only less happy in the 15 week duration condition. There is also a further interaction with sex, *F*=1.65, *p*<.02; the unsettled nature of B34 infants early on is more marked in girls than in boys. No other interactions with session number were significant.

DISCUSSION

We consider here (1) the representativeness of the sample from which our conclusions can be drawn, (2) whether infants did settle with a new caregiver, (3) whether sex of child was a factor in this, (4) whether attachment type with mother was a factor, (5) whether temperament was a factor, (6) whether frequency of visits was a factor, and (7) whether previous experience of separation or of non-parental care was a factor. Finally, some comparisons with previous studies are made.

The representativeness of the sample

Although our sample of infants was quite large, it was essentially a volunteer sample. Table 1 enables us to make some judgments about its characteristics and how it might differ from a random sample. There are no obvious biasses with respect to sex of child, or presence of siblings, and the low incidence of complications in delivery, hospital separations, and illnesses may well be representative. However, it is certainly clear that the sample is biassed toward upper/middle class families, who made up over 80% of our sample. It is also likely that the amount of previous non-parental care is lower than would be found in a random sample, as families with both parents working and/or already using substantial amounts of childminding would not have been interested in the small extra amount of babysitting that our project could provide. Thus, the sample is mainly of middle class families where the mother is at home at least for much of the time.

Table 4 shows a high proportion of type B, "securely attached" children were in our sample. We do not know whether this was a bias in our sample, or a cross-cultural difference, since there is no other U.K.-data on attachment typing to compare with. In any event, sufficient "insecurely attached" infants were in our sample to enable analyses related to attachment type to be carried out. Finally, dropout at the data-gathering stage may have removed a small number (around 10% of final numbers) of less adaptable children who failed to settle, although no significant differences between these dropouts and the main sample were detected.

Do infants settle with a new caregiver?

The evidence as to whether an infant settled with the caregiver comes from the observational data analyzed so far; the greeting/separation data, the reaction to probes, and the data on mood with sitter. Both the general level of the behavior with the sitter, and the direction of change over the 15 sessions which each infant experienced, are considered.

The evidence suggests that most infants were reasonably well settled with the sitter. First, most of them greeted her in a mildly positive way, waving or smiling at her arrival (Table 5); they were also relaxed at her departure. Separation from the mother did bring about crying in about half the number of infants, but the sitters' commentaries on the separations, and the mood data (Figure 1) indicate that such crying was fairly brief in most (not all) cases. Secondly, infants responded positively to about half of the sitters' probes, and negatively to only a small proportion (Table 16). These probes were vigorous games which are normally not acceptable from a complete stranger; in our project they were usually initiated in the third session. Finally, the infants were usually in a neutral or moderately positive mood with the sitter (mood 2 of 3: Figure 1). The sitter was clearly not an attachment figure in the way the mother usually was (compare greetings to sitter, and to mother, in Table 5); but equally, most of the infants seem to have been settled with the sitter most of the time.

Having made this general statement, some provisos are in order. From Table 5 it can be seen that 16 infants (22%) did engage in prolonged crying at the mother's departure. In some cases we know that this could persist through much of a two-and-a-half hour session, or result in the infant falling asleep from exhaustion. A few infants (10%) also regularly cried at the sitter's arrival. Also, although most infants responded more positively than negatively to probes, 4 infants did respond in a predominantly negative way, while another 8 did respond negatively about as often as positively. This evidence suggests that there is considerable variability in the degree of settling in, with some infants (some 10 to 20%, depending on one's measure) experiencing appreciable emotional upset or difficulty in settling.

Tables 6 and 16, and Figure 1, also present data on the changes over the 15 sessions. Table 15 indicates that although greetings and separations became more relaxed in a majority of the sample, for about a third of the sample they became less relaxed. The trends in modal greeting and separation were in fact usually fairly small (note the relatively high proportion of "no change" infants in Table 6), so it is only in a smaller proportion of these infants that the downward trend is an appreciable one. Nevertheless, a similar proportion is seen in Table 16, where 20 infants (28%) became less positive to probes (this could, of course, be confounded by sitters trying more adventurous probes, but this is not obviously indicated by the content of the probes recorded by the sitters).

The data from mood through the half-hour observation sessions tend to be more reassuring. Most infants become more relaxed in mood as visits progressed. This improvement is especially marked in the first few visits. Inspection of subgroup and individual means on this mood data reveals few if any infants who show any opposite trend. However, it must be remembered that data for 17 infants is not in this analysis, due to incomplete data records. While sometimes due to illness or unforeseen circumstances, many of these missing records are due to upset (with the sitter effectively unable to record), or to the infant being asleep (in some cases, though not all, apparently a consequence of emotional upset). Thus, there is again a subset of some 20% of infants of whom we cannot say that mood, when left with the sitter, was relaxed, or showed an improvement over sessions.

In summary, the majority of the infants were relaxed with the sitter for most of the time, and many became more relaxed, especially over the first few sessions. Most responded positively to stimulating games ("probes") from the sitter. However, a minority, estimated between 10 to 20%, seem to have experienced appreciable problems in settling by a number of criteria. Subsequent sections examine correlates of this variability with other factors assessed in the project.

Is sex of child a factor in settling?

There is virtually no evidence that boys or girls differed overall in how they settled with the sitter. None of the analyses with greeting or separation data were significant. None of the comparisons on probe data were significant (Table 16). There was no main effect of sex, or interaction with visit, on the mood data. The only significant finding was that the extra difficulty that B34 infants experienced in settling (on mood data), was mainly located in girls than boys. Given the considerable number of analyses carried out, however, the summary conclusion must be that sex of child does not seem an important variable.

Is attachment type to mother a factor in settling?

Several lines of evidence suggest that attachment type to mother has some relation to the child's settling with a new caregiver (and perhaps, to the mother's perception of this).

The strongest connections are with B34 infants (most of these are B3: see Table 1). Most of the infants who respond in a modally negative or unresponsive way to the sitter's arrival, are B34, and they are also more likely to show ambivalence (Tables 7, 8). This reaction is shown to the sitter, but definitely not to the mother (cf. Table 9). There is some tendency, though not statistically significant, for the B34 infants to be least positive to the probes (Table 16). Also, Figure 3 indicates that B34 infants are the least positive in their mood with the sitter in the early sessions. Since B34 babies are characterized by their tendency to be distressed in the Strange Situation, and to seek immediate contact with the mother, these findings are not surprising and indeed provide some validation of the attachment typing procedure. They can also be taken, however, as an indication that some infants characterized as B34 in the Strange Situation will settle less well with a new caregiver, at least in the early sessions.

These conclusions about B34 infants are based on the reactions to the sitter (greeting, probes, and mood). However, if mothers judge the settling process by how the infant reacts to themselves (rather than the sitter), then some mothers of AC infants may be anxious. AC infants are more likely to show ambivalence to the mother on her return (Table 9). Again, this is not surprising given that AC infants are characterized as showing avoidant or ambivalent reunion behavior in the Strange Situation, and it serves as another validation of this classification scheme. However, mothers of AC infants may feel disturbed at this reaction when judging the effect of the babysitting. Nevertheless, AC infants do not seem less settled with the caregivers, judging by the greeting/separation data. They are actually less ambivalent to the sitter's arrival, and to her departure, than are B infants (Tables 8, 10), and tend to be generally the most positive to her arrival (Table 7). They do not differ from B12 infants in reactions to probes (Table 16). There is some indication from Figure 3 that AC infants are less relaxed in mood with the sitter than are B12 infants, but they are more relaxed than B34 infants.

In summary, B34 infants seem by some criteria to have more difficulty settling with the sitter. However, some mothers of AC infants may perceive problems because of the way some of these infants react to their return, even though the ambivalence of AC infants with the mother does not seem to generalize to relations with the sitter.

Is temperament a factor in settling?

The Toddler Temperament Questionnaire was found to be a reliable instrument, and to show moderate validity as judged by inter-rater consistency. Rather few relations of temperament were found to the greeting and separation data. However, a fairly consistent pattern of results was found for the approach/withdrawal dimension, APP/W. Infants rated high on "withdrawal" by mothers were more negative to the sitter's arrival, and were less likely to become more relaxed in greeting the sitter (Table 15). This is similar to the reaction just noted to be characteristic of B34 infants, and indeed B34 infants were rated higher on "withdrawal" by both mothers, and sitters.

In summary, "approach-withdrawal" is the only temperament dimension found to clearly relate to difficulty in settling.

Is frequency of visits a factor in settling?

Half of the infants experienced one visit a week from the sitter ("15 week infants"), while half experienced three visits a week ("5 week infants"). These infants did not differ on attachment typing, and were matched for sex and age.

Duration of visits had little effect on greetings and separations. 15 week infants are slightly more likely to greet the mother negatively on her return (Table 11), but are somewhat more likely to become more positive to the sitters' probes (Table 16). They have a less happy mood with the sitter in the early sessions (Figure 2).

In summary, duration of visits seemed to have little impact. There is some evidence that 15 week infants had slightly more trouble settling, but that this improved as visits progressed.

Is previous separation experience a factor in settling?

The interview with mothers provided data on siblings, delivery complications, and illnesses, none of which showed any appreciable pattern of relationships to the greeting/separation data. However, two questions in particular were relevant to previous separation experience: whether the infant had experienced any overnight separation from parents (28% of sample), and what amount of non-parental care the infant experienced through the week (36% experienced 3 hours or more: Table 1). These did show some relationship to greetings and separations.

Infants who had experienced some overnight separation from parents showed greater relaxation in separating from both mother, and sitter, through the 15 visits (Tables 12, 13).

Very few of these infants became less relaxed. Infants who experienced at least 3 hours/week of non-parental care (before their participation in the project) tended to be more positive in greeting the sitter on arrival and greeting the mother on her return, and were more positive in separating from the sitter (Table 14).

In summary, previous separation experience seemed to ease future separations, and previous babysitting experience seemed to generally ease transitions between sitter and minder. A necessary proviso here is that the previous separations were not usually extensive (often just one night), and the amount of previous babysitting was usually moderate (mostly 3 to 9 hours/week).

Comparisons with previous research

Theory and research in the 1960's and early 1970's stemming from Bowlby's (1953, 1969) hypothesis of monotropism, and of a prevalent "fear of strangers" response at around 9 months of age, had suggested that infants aged 1 to 2 years would find it difficult to form social relationships with a new caregiver, or feel secure with that person in the absence of the mother or primary attachment figure. Nevertheless, much practical experience of moderate shared care contraindicates this view (see Smith, 1980, for a review). Work by Ricciutti (1974) and others has indicated that infants can show evidence of secure relationships with non-parents who play a substantial role in looking after the child (e.g., day care personnel; or metaplot in Israeli kibbutzim). On a smaller but more detailed level of laboratory investigation, Bretherton (1978) and Smith et al. (1981) documented the beginnings of a new social relationship between infant and caregiver over a small number of short sessions. Our present results provide a link between these two sets of studies, indicating that, for most infants at least, a relationship with a new caregiver is usually satisfactory and does develop over sessions, with the greatest change in the first few sessions. Our findings also indicate variability in this process, and some concern over a minority of infants who do not settle well. These concerns may be relevant in considering some aspects of childminding, and of the anxieties about children settling with childminders focussed for example by Bruner (1980).

Our results have related (and sometimes failed to relate) several factors to this variability in settling. These can only be compared with previous research relating similar factors to "stranger sociability", usually assessed at a single session in a laboratory. The previous studies examining attachment type and stranger sociability have come up with findings reasonably concordant with our own; B12 infants have been found to be most sociable (Thompson & Lamb, 1983; Lamb et al., 1982, by father's attachment type only; Main & Weston, 1981, for B infants generally). Our own results focus the difficulties in settling more definitely on the B34 infants, though with an indication that AC infants may apparently seem unsettled to mothers, due to their ambivalent reaction on reunion.

Previous work relating temperament to stranger sociability has produced a somewhat mixed pattern of results, but the most consistent feature has been the linking of APP/W to the ITQ or TTQ, or the corresponding dimension of "fear" on the IBQ, to stranger sociability, with - not surprisingly - withdrawing or fearful infants being less sociable to strangers (Scarr & Salapatek, 1970; Stevenson & Leavitt, 1980; Thompson & Lamb, 1982; Berberian & Snyder, 1982). Our own results produced a similarly somewhat mixed pattern, but with APP/W being the dimension most clearly linked to ease of settling in with a new caregiver.

There is little relevant literature on whether previous separations or experience of non-parental care facilitate social adjustment to a new caregiver, although this is an important practical question. The clearest investigation is a recent study by Jacobsen and Wille (1984), who related the amount of time per week spent in non-parental care, to separation distress as measured for example by time spent playing during the Strange Situation. They obtained a curvilinear relationship, with less time spent playing by infants who were either very low or very high on time spent in non-parental care. Their data are consistent with our own, since our sample is all at the lower end of their measure of time spent in non-parental care (which in their sample went up to 50 hours/week). Thus, our sample falls within the "rise" section of their curvilinear trend; both studies are consistent with an increase in ease of adjustment to parental absence, with a moderate amount of previous separation/non-parental caregiving experience.

Finally, there is also very little previous work relating frequency of visits to adjustment to the caregiver. Smith (1980) suggested this might be a factor, but the present study found rather small effects. Smith and Turner (1981), relying on mother's reports, only found evidence for an effect of frequency of visits when comparing caregivers who only saw an infant once a month or less, with those who visited more frequently. Our less frequent visits were still at a rate of once per week, and it may be that any effects of increasing frequency of visit are not very noticeable at this level.

PRACTICAL IMPLICATIONS

These can be drawn out more fully when all the analyses are completed. Meanwhile, the most salient findings with practical implications can be summarized.

(A) In this study, most infants were found to settle reasonably well with a new caregiver, even if some upset was shown at initial separations. This can be reassuring to mothers who have to make alternative care arrangements. It must be borne in mind, however, that our infants were experiencing "babysitting" rather than "childminding"; it may be easier for the infant to experience the former, than the latter. Also, our sitters were well educated and trained persons. Thus, our data does not directly address whether an infant will settle in a childminding arrangement, where many factors must be considered. However, it does suggest that (contrary to earlier versions of attachment theory, e.g., Bowlby, 1953), the absence of the mother/primary caregiver does not in itself usually prevent satisfactory adjustment to a new, part-time caregiving relationship.

(B) In our sample a minority of infants did nevertheless seem to experience some difficulty in emotional adjustment. Such difficulties affected boys and girls with equal probability. For such infants it may take a longer time (relative to our 15 three-hour sessions) to really settle in to the new caregiver, and/or some more gradual transition (e.g., more joint time with both primary and new caregiver) may be desirable. Our data suggest that these infants are likely to be ones who are rated as generally tending to withdraw in new situations, and who are very clingy to the primary caregiver after separation (type B3 or B4 in the Strange Situation procedure). This may suggest that parents who notice these characteristics in their infant, may correctly anticipate a greater likelihood of problems in adjustment to a new caregiver. However, it must be borne in mind that both the temperament rating and the attachment typing relate to the mother-infant dyad in this study. Thus, some characteristics of the mother may influence both. In other words, some "anxious" mothers may contribute to the adjustment problem, or the perception of it. Further analyses using the father and sitter temperament ratings may enable us to partially disentangle the extent to which the actual adjustment problem is coincident with the mothers' perception of it.

(C) There is no evidence from this study that a babysitting arrangement on a once per week basis will create any more problems (at least after the first few visits) than arrangements on a more frequent basis.

(D) There is no evidence from this study that a moderate amount of previous separation experience (e.g., a night or so away from parents), or a moderate amount of previous non-parental care (e.g., 5 to 10 hours per week), will create greater difficulties for a new caregiving arrangement. In fact, the evidence suggests that such experiences may actually ease further adjustments. Other research suggests that this finding may not be generalizable when much larger amounts of separation/ non-parental care have occurred.

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CHAPTER 4

MATERNAL EMPLOYMENT AND DAY CARE: EFFECTS ON ATTACHMENT

Frits A. Goossens

ABSTRACT

In this study the focus is on quality of attachment of traditionally reared and day-care reared children and its determinants. The results indicate that single-earner and dual-earner families differ strongly in attitudes and task division between partners. The day-care experience does not seem to affect quality of attachment negatively. Working mothers are as sensitive as nonworking mothers. Dependent patterns of attachment are more common among home-reared children, and seem to be associated with forms of maternal unavailability. Security of attachment among traditionally reared children was related to renewed availability following separations. No such results could be reported for the children receiving supplementary care. The discussion stresses the importance of (determinants of) maternal sensitivity and separations in relation to maternal employment and day care.

INTRODUCTION

In essence, attachment theory can be reduced to three assumptions:

1. The human neonate is born equipped with a number of behavioral systems that have evolved because the usual consequence of their activation has contributed to the survival of the species. Among these environmentally stable behavioral patterns are attachment behaviors which are likely to result in the care and protection of the young.

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Every newborn child has a number of relatively diffuse behaviors (crying, looking, following with its eyes) that may effect the proximity of a grown-up conspecific, usually the biological mother. Attachment behavior, and the proximity it results in, is presumed to have a biological function, i.e., protection against danger, but also provision of food, water, warmth and shelter. The more often attachment behavior leads to the proximity of a caring and protective conspecific, the greater the likelihood of survival (Bowlby, 1971).

2. As a consequence of its increasing cognitive competence, the young child in the course of its first year learns to assess how adequate it is in effecting the desired predictable outcome. When the child's experience has been such that even the smallest of behavioral signals has led to the desired proximity of the intended grown-up, it will develop confidence in the availability of this person (and consequently self-confidence in its ability to elicit appropriate responses from preferred individuals). The child learns to use this person as a secure base to explore from and a safe haven to return to in case of (perceived) danger. In such a case, one speaks of a secure attachment relationship, and the adult is the attachment figure. However, not all attachment relationships are secure; some are anxious because the child has too often failed to effect the desired proximity. It will therefore not develop confidence in the availability of its attachment figure or in itself (Bowlby, 1971; 1975).

The attachment figure is held to be responsible for the quality of interaction between the child and him or herself. In order to effect interaction of a high quality, the attachment figure has to be sensitive, i.e., be able to perceive and interpret accurately the signals and communications implicit in the infant's behavior, and given this understanding to respond to them appropriately and promptly (Ainsworth, Bell, & Stayton, 1974).

3. Separations from attachment figures are potentially dangerous to the child, since it is left without its trusted protectors/caregivers. These separations are likely to lead to feelings of anxiety, which may affect adversely the quality of the attachment relationship with the caregiver(s).

In short, the attachment theory states that children are born with a ready capacity for displaying attachment behaviors which become directed at effecting the proximity of some preferred individuals; the result of this display of attachment behavior is an attachment which can be described as an affective relationship between child and caregiver which is specific in nature and relatively enduring over time. It is the adult's sensitivity to the child's signals which is responsible for the quality of the relationship (Ainsworth, et al., 1974;

Ainsworth, Blehar, Waters, & Wall, 1978). In addition to sensitivity of the caregiver, separations are also important determinants of the quality of the relationship.

In this chapter I will concern myself with what determines the quality of attachment in relation to maternal employment and the toddler's routine caregiving arrangements. Firstly, I shall argue that regular supplementary care need not in itself be seen as a separation likely to lead to anxious attachments. Secondly, I will briefly review the literature dealing with the subject of day care and maternal employment and formulate my point of departure on this issue. The second part of this chapter consists of a report on the results of a study I have carried out in this area.

SEPARATIONS IN A SOCIAL CONTEXT

Within attachment theory, separations are undoubtedly conceived of as situations resulting in a child's feeling anxious due to being cut off from its attachment figure(s). They are depicted as endangering the quality of the attachment relationship. On the other hand, there is now weighty evidence that both the nature of the separations as well as the quality of the relationship beforehand determine whether and/or to what extent the child is likely to feel anxious. Experimental research with animals (Spencer-Booth & Hinde, 1971; Hinde & Spencer-Booth, 1971; Suomi, Collins, Harlow, & Ruppenthal, 1976; Plooy & Van der Ryt-Plooy, 1983), observations of children under naturally occurring separations (Robertson & Robertson, 1971; Bloom-Feshbach, Bloom-Feshbach, & Gaughran, 1980) and experimental laboratory studies with young children (Ricciuti & Poresky, 1973; Willis & Ricciuti, 1976) all lend support to this view.

The presence of familiar caregivers and familiarity of the environment (availability of peers and toys) are generally considered to be mitigating circumstances that are likely to counteract feelings of anxiety following a separation. Evidence that these mitigating conditions also occur in relation to day care is of two kinds:

a) studies indicating that children adjust well to the vicissitudes of daily care by professionals (Schwartz, Krolick, & Strickland, 1973; McCutcheon & Calhoun, 1976; Roopnarine & Lamb, 1978; Blanchard & Main, 1979);
b) studies indicating that professional caregivers are likely to become attachment figures (Rubinstein, Pederson, & Yarrow, 1977; Rubinstein & Howes, 1979; Ragozin, 1980; Warren Anderson, Noyle, Roberts, & Smith, 1981; Krentz, 1982).

Although still somewhat scanty, the evidence is not without consistency, and it warrants a different view of regularly occurring supplementary care. In my view, such care can better be seen as a social separation involving the reunion with other attachment figures.

It should be noted here that this view does not necessarily cast doubt on the potentially harmful effects of separations. It does mean, however, that separations that are part of a routine caregiving arrangement may not be so anxiety-provoking as the attachment theory would have us believe. It may even be that these regularly occurring separations are beneficial, in that they may initiate coping mechanisms that would otherwise lie dormant for a long time. I will return to this point later on in this chapter.

STUDIES COMPARING THE ATTACHMENT BEHAVIOR OF DAY-CARE-REARED AND HOME-REARED CHILDREN

The studies that have been carried out on attachment behavior of children undergoing some form of supplementary care can be divided roughly into two categories: the strictly day care studies and the maternal employment studies. The distinction is somewhat artificial, since in part their interests overlap. What I mean is this: in day care studies, the focus is predominantly on the formal characteristics of the alternative care itself (or the subjects involved) while in maternal employment studies, one is *mainly interested* in what goes on within the family. Examples of the former are type of care (Clarke-Stewart, 1979; Everson, 1982), quality of care (Caldwell, Honig, Tannenbaum, & Wright, 1970; Everson, 1982), former day care experience (Brookhart & Hock, 1976; Moskovitz, Schwartz, & Corsini, 1977; Portnoy & Simmons, 1978; Hock & Brookhart Clinger, 1980), age at entry (Blehar, 1974; Ragozin, 1980; Vaughn, Gove, & Egeland, 1980), weekly attendance (Clarke-Stewart, 1979; Vaughn et al., 1980) and number of different caregivers, including the parents (Clarke-Stewart, 1979). Sex differences (male children are more often found to be upset by such arrangements) are mentioned by Caldwell et al. (1970), Brookhart and Hock (1976), Moskovitz et al. (1977), Portnoy and Simmons (1978), Roopnarine and Lamb (1978), Hock and Brookhart Clinger (1980), and Everson (1982).

The focus of the maternal employment studies is somewhat less varied. They all seem to follow Yarrow, Scott De Leeuw and Heinig's (1962) suggestion that what is relevant to the question of maternal employment is not the status itself but the fulfilment derived from that status. Thus, we find Hock

(1980) formulating the hypothesis that maternal satisfaction is related to the degree of congruence between a mother's perceptions of her own needs and her perceptions of her child's needs. Everson (1982) feels that an inconsistent attitude towards alternative care may be harmful, while Easterbrooks and Goldberg (1985) believe there should be consistency between actual and preferred employment status.

Perhaps the most Bowlbyan view is taken by Vaughn et al. (1980). They expected routine daily separations during the first year of the child's life to contribute to an excess of anxious avoidant attachments. This expectation was confirmed, although the total number of securely attached infants was not smaller among those who received supplementary care than among those who were reared in the traditional way. The degree to which the family remained intact and stressful daily events were also found to be influential. Vaughn and colleagues (1980) go so far as to suggest that work may make mothers psychologically less available and physically less accessible; in other words, less sensitive. This seems to be confirmed by Easterbrooks and Goldberg (1985), but not by Hock (1980). On the whole, however, these studies only rarely report differences in quality of attachment between home-reared and day care-reared children. Only Vaughn et al. (1980, and Blehar, 1974) reported results favoring the traditional type of child rearing.

Some studies (Kagan, Kearsley, & Zelazo, 1978; Hock, 1980; Vaughn et al., 1986; Everson, 1982; Easterbrooks & Goldberg, 1985) mention differences between parents from single-earner and dual-earner families (in child-rearing values, attitudes towards employment and care by others, amount of interaction time with child and personality characteristics and sensitivity, albeit the latter with inconsistent results). Finally, as expected, all these studies seem to indicate that the effect of certain factors is mediated by the mother's employment status, i.e., the extent to which there is congruence between actual and preferred status.

Let me now formulate my point of departure:

1. sensitivity and quality of attachment are related, in the sense that highly sensitive mothers usually have securely attached children;
2. regular alternative day care is not likely to influence quality of attachment, but other (non-routine) separations may well lead to anxious attachments;
3. regarding the mother's ability to be sensitive, the partner's contributions are of crucial importance;
4. the working status of the mother is not so much an independent variable as it is an intervening variable, in the sense that it acts as a filter in determining the consequences of certain situations or conditions.

These are my guide-lines for building a hypothetical framework within which the issue of maternal employment can be tackled.

This means examining the factors that influence sensitivity, and thus quality of attachment, and how these develop in view of the working status of the mother. A similar procedure will be followed for separations. Here I will take into account the working status of the mother and experiences with separations that day-care reared children have. The distinction between sensitivity and separations is somewhat artificial, since in reality they are often related: insensitive mothers may make their children undergo more separations than these can handle, while the occurrence of separations may lead to anxious attachments which can, in turn, affect sensitivity. However, discussing them separately adds to the elegance of the discourse.

A HYPOTHETICAL FRAMEWORK FOR THE STUDY OF ATTACHMENT OF DAY-CARE-REARED AND HOME-REARED CHILDREN

Sensitivity

Just as the behavior of the child may be described as controlled by two opposing tendencies, i.e. the tendency to explore and the tendency to seek proximity, so too can the behavior of the adult be described as moving between two opposite poles: retrieving or caretaking and "work" (chores, attention to other children, outside employment - Bowlby, 1971). The child explores when it feels safe and retreats to the attachment figure in case of (perceived) danger. Something similar obtains for the attachment figure; there is attention for the task one is involved in, but that task is dropped when the child requires attention. Of course, events do not always proceed as regularly as described above, but generally speaking this occurs often enough to speak of a predictable outcome (Bowlby, 1971). That is to say, the attachment figure will usually find the time and opportunity to respond adequately (the hallmark of sensitivity) to the child's signals. According to Bowlby, the situation gets out of hand when the attachment figure becomes over-involved in one of the two poles, either by lavishing too much attention upon the child, or by too strong a commitment to work.

The former situation of too much attention for the child is more likely to occur in small families, in which the mother fulfils the traditional role and is relatively undistracted by chores (Bowlby, 1975; Van IJzendoorn, Tavecchio, Goossens, & Vergeer, 1982). On the whole, however, traditional families are usually larger in size than non-traditional families (Russell, 1983). Some amount of conflict between the two poles of attention to children and commitment to work is normal, and may actually have a beneficial effect. In survey research one finds that most housewives report some common but occasional tensions between running the household and caregiving, while working mothers report more conflicts between outside employment and taking care of the child(ren). Usually a solution is found by compartmentalizing the household or enlisting the assistance of the husband (Olson, 1979). As regards the employment status of the mother, it seems likely that in traditional families the risk of overprotection is greater, while in non-traditional families the work pole may take up too much time and attention.

Thus, we see that in both traditional and mother-employed families situations may obtain that lead to a decreased sensitivity on the part of the mother, but that the situations themselves differ. We also find a potential explanation of why differences between home-reared and day care-reared children are so rarely reported. Apparently, neither situation is a sufficient guarantee for a healthy development of the child. The results of Vaughn et al. (1980) can easily be interpreted in this light, i.e., work-related stress affecting maternal sensitivity, which in turn affects attachment relationships.

Partners

Aforementioned authors also report another cause for the higher frequency of insecurely attached infants among working mothers, i.e., the absence of a partner. Similar suggestions are voiced by Donahue-Coletta (1979; 1983). The importance of the husband is stressed in numerous studies on the division of tasks within the family, which show clearly that the mother's task is greatly relieved if she can count on the support of her husband for running the household and caring for and interacting with the children.

On the whole, fathers in dual-earner families seem to do more in this respect than fathers in single-earner families (Safilios-Rothschild, 1972; Holmström, 1972; Young & Wilmott, 1973; Rapaport & Rapaport, 1973; Hoffman & Nye, 1975; Hoffman, 1974; 1977a,b; 1979; Gecas, 1979; Rapaport, Rapaport, & Strelitz, 1977; Pleck, 1979; Huber & Spitze, 1981; Russell, 1982; 1983; Lamb, Frodi, Hwang, & Frodi, 1982). These studies indicate that the father's contribution is on the increase and that they contribute more particularly when they are egalitarian minded and consider themselves just as capable of carrying out these tasks as their spouse (Vergeer & Van IJzendoorn, 1981; Lamb et al., 1982; Russell, 1982; 1983).

Especially important in this respect is that mothers should have the opportunity to play with their children, since the context of playful interaction enables her to learn about the child and to develop her own sensitivity (Dunn & Kendrick, 1981; Van IJzendoorn, Vergeer, & Van Vliet-Visser, 1984). Such an opportunity can only be created if the husband is prepared to carry out other tasks such as cooking, cleaning up, caregiving. For this reason I believe the husband's contributions to such traditionally female chores is important. Also if the mothers have to do all these various tasks, it may lead to dissatisfaction, a factor I believe may play an important role in both types of families. I expect, however, that working mothers in particular will put higher demands on their husbands because of their occupation elsewhere.

To summarize, in both types of families, situations may arise which lead to a decreased sensitivity on the part of the mother. These situations are likely to be different for the two types of families. The risk of overprotection is greater in traditional families, but the risk of a work overload is greater in non-traditional families. This risk of overprotection probably decreases with increasing family size, which also necessitates enlisting the aid of the husband. In non-traditional families, the role of the husband in reducing a potential work overload for the wife becomes even more important. Husbands in these families should be prepared to contribute to household and caregiving chores. They are more likely to do so if they see men and women as equals.

Roles

Nowadays, two roles are very important to the modern woman, the maternal role and the career role. These roles may be at conflict with one another, either because one feels guilty for leaving the children in the care of others while working or because one feels resentful for not being able to work. Guilt feelings are probably beneficial in that they may lead the working mother to apply "compensatory" strategies and provide the child with high quality interaction (Hoffman, 1979). Resentment may decrease sensitivity. Whatever the case, there is likely to be a certain amount of strain between motherhood appreciation and career orientation.

If we take a look at the figures concerning women's participation in the labor force in the Netherlands, we can distinguish two trends: more women participate in the labor force than ever before, and they no longer stop working after marriage (Veerman & Verheyen, 1984). It is also known that most women appreciate the combination of work and marital status (Oudijk, 1983). Yet, on arrival of the first child, most women give up their job. We ourselves found that the combination of work and motherhood is not seen as ideal by many mothers and their spouses (Tavecchio, Van IJzendoorn, Goossens, & Vergeer, 1984). Alternative care is not common, and not always looked upon favorably (Instituut voor Psychologisch Marktonderzoek, 1974; Meyer, 1977; Van Rijswijk-Clerkx, 1981). It has also been discovered that precisely those women with the better paid jobs (i.e., those women who have had a good education) are more likely to continue working or return to the labor market relatively quickly (Clason, 1977; Van Doorne- Huiskes, 1979). These are also the women with husbands who look favorably upon their return to the labor force, and are prepared to invest extra energy into the goings on at home. These husbands are often from the higher socio-economic classes, and are more egalitarian-minded, though usually not quite as much as their wives (Meynen, 1977; Tavecchio et al., 1984). Thus, the decision to combine work and motherhood may not only have been inspired by the importance the woman attaches to outside employment, but also by the attitude of the husband and his willingness to co-operate at home. There are even indications that husbands who look unfavorably upon the combination of motherhood and outside employment sabotage their wives' desire for fulfilment by not making a (sufficient) contribution at home (Hoffman, 1977). Apart from the fact that once again we are confronted with the importance of the husband, we see also the importance of the career orientation of the wife. (Hock, 1978; 1980). In addition, the decision to combine the two roles is also influenced by a more egalitarian minded outlook.

Congruence

Women who stay at home to run the household and take care of the children, but who would prefer to work, find themselves in a frustrating situation (Yarrow et al., 1962). It seems likely that this will have a harmful effect on their sensitivity. Results that this is indeed the case are reported by Farel (1980). Yarrow et al. (1962) also suggest that working mothers with a low career orientation will be frustrated because they would prefer to interact with their children. There is empirical support for this assumption. Working mothers with an ambivalent attitude towards supplementary care (women who - I presume - would have preferred to stay at home) were found to have children whose behavior was indicative of an insecure attachment (Hock, 1980). Career orientation is important in relation to both working and non-working mothers, but the effect of this variable is likely to differ in the two cases. A high career orientation is likely to be conducive to maternal sensitivity for working mothers, but not for non-working mothers, and vice versa.

To summarize: as regards the two roles that are important to the modern woman, I have selected some factors that may jeopardize her sensitivity. Firstly, motherhood needs to be valued for internal reasons. Secondly, there is likely to be a stressful relationship between the demands of motherhood and those of a career. Thirdly, mothers who prefer to work and do so may not find their husbands on their side or if they do not, may feel resentment.

Finally, there is one other factor of importance in connection with sensitivity. I propose to call it pedagogical involvement, by which I mean an attitude of nurturance and interest on the part of the parents in the child. (cf. Lamb, Chase-Lansdale, & Owen, 1979). Such an attitude is equally likely to occur amongst working and non-working mothers. I also expect it to be related to appreciation of motherhood, in the sense that those mothers who value motherhood for internal reasons are likely to be highly involved with their children.

Separations

Separations also influence quality of attachment. I have already discussed day-care routine separations in which mitigating circumstances are likely to occur. To be precise, I assumed that day care would involve the reunion with another attachment figure. This may explain why so few differences in quality of attachment between day care-reared and home-reared children have been reported. Blehar (1974), who did find differences, i.e., more insecurely attached day-care children, suggests that her results may have been caused by the inferior quality of the centers in her sample. Similar explanations have been expressed by other authors, who claim that the lack of differences is a result of most researchers using centers of high quality in their studies. (Belsky & Steinberg, 1978; Bronfenbrenner, 1979). One might also reason the other way around and claim that if good nurseries do not effect anxious attachments, society has a task in ensuring that the quality of lesser centers is improved. (Kamerman & Kahn, 1981). Apart from that, it would seem evident that parents will generally seek alternative care that meets their standards. It is important for working parents to feel that their child is safely and competently cared for (Harrell & Ridley, 1975; Warren Anderson et al., 1981). The quality of alternative care is an intervening variable that needs to be taken into account.

One other variable that suggests itself for inclusion in this study is the sex of the child, since sex differences have been reported in the day care literature. There are other separations which need to be considered, and which may have different effects, depending on the working status of the mother and the child's experiences with alternative care. Among these are a perinatal stay or later hospitalization and overnight separations. Contrary to alternative care, these separations are unpredictable for the child, and in the first two cases involve staying behind in a strange environment. This may not be the case with overnight separations. Parents are likely to leave the child with someone they know and trust, and who is familiar with the child (and vice versa).

A perinatal stay in the hospital

A perinatal stay may point to deficiencies, illness or weakness of the child, which in themselves may influence the nature of the interactions between child and caregiver (Fraiberg, 1974; Greenberg & Marvin, 1979). Also knowledge of a deficient physical condition of the new-born may influence the mother's decision to return to work. Knowledge of a weak physical condition of the child may lead to the decision to refrain from future work, which may lead to resentment if the mother is highly career oriented. If the mother decides to return to the labor force, it is possible that the child will not get the attention and compensation that may be necessary to effect adequate interaction. I shall not include handicapped or chronically ill children in the study, but one variable that offers itself for inclusion is weight at birth, since it has been found to be associated with anxious attachments (Connell, 1977). Knowledge about the physical condition of the newborn is important both to mothers who are traditionally oriented and those who want to return to the work force, but presumably even more important to the latter.

A stay in hospital

A similar situation obtains in the case of a hospital stay. A stay in hospital is the most severe of separation experiences for the child, and is likely to lead to a (temporary) anxious attachment. Among the factors which, in addition to separation from attachment figures, are the cause of much stress we find (1) a strange environment, (2) inadequate substitute caretaking, (3) strange caretakers, (4) multiple caretakers, (5) cues - language or signals - not understood or responded to, (6) unfamiliar food and routines, (7) unusual demands and disciplines, (8) illness, pain and bodily interference, and (9) bodily restrictions. At the same time, there is very little to reduce stress, beyond some personal belongings (cuddly toys) and some known routines and foods (Robertson, & Robertson, 1971). On returning home, these children are likely to be demanding of their mother and resist any threatening separation of whatever kind (Robertson & Robertson, 1971).

Such a situation is more easily handled in the case of traditional families where the mother is at home. Working mothers may not be able to make available themselves to their children because of their work. They may be forced to take the child to the center at a time when it is still recovering from a major separation and wishes to stay in its most familiar environment with one of its most familiar persons. The professional caregiver, who - as I have argued - may be an attachment figure, may not be the most suitable person to leave the child with because of the competing demands of other children while the recently hospitalized child is extremely clinging and demanding of undivided attention, which is easier to give in the relatively isolated context of the family.

Overnight separations

Hock (1978) claims that working mothers are more confident of the quality of care by others than traditional mothers. Apart from the fact that working mothers have to use some regular form of alternative care because of their absence during (part of the) day, this is also likely to show up in their leaving their child more often with others for a few nights. Like regular alternative care, overnight separations are instigated by the parents (unlike a perinatal or hospital stay). Also, they have to be distinguished from these latter two, in that they involve familiar caregivers. Whereas in the case of a hospital or perinatal stay children of working mothers might be at greater risk, because the mother may not be able to make any necessary adaptations or resent them, I would surmise that overnight separations might have a greater impact on children from traditional families, since they are less used to separations in general. On the other hand, one might argue that their mothers have more time and opportunity to counteract the effects of these separations (as in the case of hospital stays). The difference is that overnight separations are set in motion by the parents and therefore less likely to be regarded as a matter requiring compensation.

Other separations may also occur and most likely in both types of families. We are referring here to the use of a sitter at night, a separation likely to take place when the child is asleep and in its own environment. Such a separation (if it may be called that) enables parents to engage in activities without being bothered by the demand of their children (relaxation, entertainment and socializing). It is probably beneficial in that it offers parents the opportunity to catch their breath.

Social experience

Children from non-traditional families undergo some form of regular supplementary care, where they come into contact with both professional caregivers and peers. As such, day-care reared children are likely to have greater experience in interaction with both adults and peers. Training of their social skills starts early, and is considered to have a beneficial effect (Waldrop & Haverson, 1975; Konner, 1975). Peer-peer interaction has become more valued by parents in recent years. It is usually not available at home because of the decreasing family size. Mothers who stay at home have the opportunity to take their child to a play group where it gets a chance to interact with peers. Another opportunity that is open to traditional mothers is to socialize with friends and relatives, and by doing this bring the child into contact with other adults. Thus, while children from non-traditional families are separated daily from their parents, and then find themselves in the company of both peers and adults, children from traditional families may obtain some of these experiences in the presence of their mother. It is important to take these socialization experiences into account here, because they are likely to lead to a lower threshold for the activation of fear. The unfamiliar has now become familiar (Bowlby, 1975).

To summarize, separation experiences and social experiences may also influence quality of attachment (or maternal sensitivity). As to a perinatal or hospital stay, children from working mothers may be at greater risk, because the conditions necessary to counteract any potentially deleterious effects may not be realizable. As to overnight separations, these children may have the advantage. They also have more socialization experience, but home-reared children may be offered other opportunities for peer-peer interaction or contact with other adults.

In my view, sensitive mothers (whether working or not) are those who feel fulfilled, who value parenthood and are committed to their child (pedagogical involvement). I have focussed on quality of mother-infant interaction rather than mere quantity, and taken account of how other factors mediated by the employment status of the wife may affect quality of attachment. Securely attached children have sensitive mothers who do not subject them to unpredictable separations or who are in a position to apply themselves to counteracting any harmful effects of such sudden separations.

METHOD

So much for the theoretical notions guiding the current research effort. I will now concentrate on the details of the study beginning with the research problem and the selection of a design. I will then provide details concerning the operationalization of the variables and the respondents. This section will end with a description of the procedure and an overview of the data collected.

The research problem

Roughly speaking, the study should answer the following questions:

1. Are there any differences in security of attachment between traditionally reared children and day-care reared children?
2. Do working and non-working mothers differ in sensitivity?
3. What differences are there between single-earner and dual-earner families?
4. What determines security of attachment of the children from these families?

Design

While selection of a longitudinal research design is undoubtedly the best option, since it enables disentangling causes and effects, this approach was rejected on both practical and theoretical grounds. The practical objections are twofold. Firstly, a number of variables have been selected for inclusion in the study, but since their operationalizations are not always readily available, time needs to be invested in the development of these measures. Secondly, in order to homogenize on the variable "supplementary care", a choice was made for day care children from officially registered centers. These can be relied upon to provide good quality care. However, this choice forced us to select 2-year olds, since younger day care children could not be recruited in sufficient numbers. Measuring quality of attachment with children older than 2 years - which these children would have been at T2 - is problematical. Thus, a single measurement seemed indicated.

The theoretical grounds deal with the aims of the investigation. On the one hand a number of global expectations and suppositions will be tested, while on the other hand the empirical evidence should generate new and more refined hypotheses for further study. These may then be tested in more suitable designs. In view of the above, a choice was made for a static group comparison design, in which a group which has experienced X (here maternal employment and the subsequent supplementary care in a center for the child) is compared with a group which has not (Campbell & Stanley, 1966). This design also allows analysis of a more correlational nature within the two groups of traditional and non-traditional families.

Measures

Background data. In a number of questions I assessed the particulars of the families participating, i.e. marital status, ages of the parents and those of the children. Other particulars were the number of children in the family, sex of target children, their weight at birth, and ordinal position of the target children (which correlated .87 and .95 with number of children in single-earner and dual-earner families, respectively). These are factual questions.

Socioeconomic status. Also factual in nature is socio-economic status. Its determination was based on information concerning professional and educational level of both partners. Professional level is rated on a 6-point scale (1 = low; 6 = high), designed for the Netherlands (Van Westerlaak, Kropman, & Collaris, 1975). Educational level is similarly rated. These four scores (two for each partner) are then factor analyzed and once again reduced to a 6-point rating scale.

Career orientation. Career orientation was measured by means of a number of open-ended and some precoded questions, taking account of the following aspects: the relationship between work and other aspects of life, plans to quit or start working and career orientation under ideal circumstances. Two slightly different versions were used depending on the working status of the mother. The total set of answers was then rated on a 9-point rating scale (1 = low; 9 = high). Test-retest reliability (n= 49) was .87. It correlated .67 (p<.001; n=101) with a similar scale.

Dissatisfaction with the husband's contribution to traditionally female tasks. In order to measure potential (dis)satisfaction of the mothers with the division of labor at home, I constructed a new measure, a discrepancy score. First, I asked both partners to indicate on a 5-point rating scale who was most often in charge of a certain task (a list of 13 tasks was given, for instance taking the children to the toilet, reading to the children, changing a diaper, making the beds). Ratings were: 1 = husband only; 2 = husband more often than wife; 3 = husband and wife equally; 4 = wife more often than husband; 5 = wife only. The scores of both partners were taken together, divided by two and subjected to a principal component analysis. Five tasks loaded on a "female chores" factor ("making the beds", "taking the children to the toilet", "changing a diaper", "reading to the children", and "bottle feeding"). The women had also been asked how they would prefer to divide these tasks between themselves and their partners. Next, I computed the difference between actual and preferred division of labor from the point of view of the women on these five tasks. This was the discrepancy score; it was expressed in absolute values. The discrepancy score now indicated to what extent the mothers would like to see a different division of labor for these female chores. Alpha was .89 for the housewives, and .81 for the working wives.

Attitude towards the female social role. Attitude towards the female social role was measured by means of a shorter version of the Slade and Jenner questionnaire (1978; Hubbard, Van IJzendoorn, & Tavecchio, 1982). The authors describe it as a simple set of items to assess women's attitude to the female social role. Both partners were requested to fill in this set of items. Alpha was .96 for the housewives and .80 for the working wives; for the husbands these figures were .90 and .83 respectively. Since the scores of both partners were relatively highly correlated, it was decided to subtract the scores of the husband from those of the wife and use absolute values. Low scores point to a more or less similar opinion, while high scores reflect differences of opinion with the husbands usually taking a more conservative stance. These records now indicate the amount of agreement between the partners.

Separation experiences The separation experiences of the child were assessed in a number of questions to the mother. A distinction was made between non-parental routine care which was expressed in total numbers of hours in routine care since birth, non-routine separations (such as overnight separations of child and mother, hospital stays of child, and use of babysitter), and the extent of regular contacts with other people, the extended context. Some children from traditional families occasionally visited a playgroup, for which they were given a score of 1 to distinguish them from the others. Overnight separations were also expressed in a total score (a summation of the various nights over the various occasions child and mother had not slept under the same roof). It was distinguished from hospital stays, which was the score of the total number of days the child had spent in the hospital (including perinatal stay). Because this measure of separation was highly skewed, it was recoded as follows: 0 days = 0; 1-3 days = 1, 4-14 days = 2; 15-30 days = 3; more than 30 days = 4. Use of sitter was expressed in mean number of hours per month. The score for extended context was equal to the number of different people (grandparents, relatives, neighbors, others) who, as indicated by the parents, regularly interacted with the child.

Activities: caregiving and playing. Both parents were asked to indicate a nominal 3-point scale whether they were involved in activities (1) without the children, (2) with the children for caregiving, and (3) with the children for playing, between 5 and 7.30 P.M. This period was chosen because it is a time of frequent interaction between parents and children (Tavecchio & Van IJzendoorn, 1982). Parents were given a caregiving and a playing score based on what they claimed to do on weekdays (multiplied by 5) plus their contributions to these activities on Sundays. These 4 scores (2 for each partner) were further reduced to 2 by subtracting the father's contribution to caregiving and to playing from those of the mother. The final scores are now indicative of the balance between the two partners; positive scores denote more involvement on the part of the mother, while negative scores indicate a stronger involvement of the father.

Motherhood appreciation and pedagogical involvement. A reliable scale for motherhood appreciation could not be constructed. Mothers invariably expressed happiness and contentment with their role. The factor was therefore deleted. The pedagogical involvement scale underwent the same fate; it failed to reach a conventionally acceptable level of alpha.

The Strange Situation

In order to measure quality of attachment I used the Strange Situation (Ainsworth et al., 1978), an instrument that hardly needs introduction. However, in this regard a few issues are worthy of consideration. These are (1) the stability of attachment behavior, (2) potential differences in attachment behavior between 2-year olds and their younger counterparts, and (3) the validity of the Strange Situation for use with 2-year olds.

Observing Strange Situation behavior. Scoring the behavior in the Strange Situation is no mean feat. We ourselves trained at Regensburg with Drs. Grossmann and Escher-Gräub in order to build up our expertise as observers. Interinvestigator reliability for the interactive scale scores ran from .77 (resistance) to .96 (proximity seeking). Agreement at the level of classification was 95% and 89.5% at the level of subclassifications. Following Regensburg we made descriptive notes on what happened in each episode, while scores were only assigned in episode 5 and 8 on the first four interactive scales. Intercoder agreement ran from .77 (proximity in episode 5) to .97 (contact maintaining in episode 8). Percentage for agreement at the level of classifications was 100, and 96 at the level of subclassifications.

The stability of attachment behaviors. The stability of attachment behavior is controversial. Positive results have been reported by Connell (1977) and Waters (1978) but Thompson, Lamb and Estes (1982) and Ainsworth et al. (1978) were less successful. It was decided to test the short term stability of attachment behavior, since we might then be able to rule out any potential contextual causes of instability. Attachment behaviors and patterns of attachment were measured by means of the Strange Situation, with a month separating T1 and T2. The results indicated that both at the level of the interaction rating scales scores (an average r of .71), and at the level of the classifications (100% correspondence), the stability was high. (For details the reader is referred to Goossens, Van IJzendoorn, Tavecchio, & Kroonenberg, 1986).

Sex and age differences in the Strange Situation. In order to check the usefulness of the Strange Situation for 2-year olds, they were compared post hoc on both the interactive scale scores and the classifications with younger children (aged 1 tot 1.5 years). Sex was included as a factor, since the finding of a somewhat greater anxiety among males has been replicated a number of times (Brookhart & Hock, 1976;

Moskovitz et al., 1977; Portnoy & Simmons, 1978). On the interactive scale scores we found both sex and age differences. The 2-year olds were more active on proximity seeking. Their greater locomotive competence is likely to have led to their getting higher scores. Males were found to be more resistant, which may be caused by their greater fragility (Egeland & Farber, 1984). More importantly, no age differences were found on the antithetical scales for resistance and avoidance to the mother. Scores on these scales determine to a large extent the classifications which showed no differences (for a more elaborate discussion we refer to Goossens, Van IJzendoorn, Tavecchio, & Kroonenberg, 1985.)

The validity of the Strange Situation with two-year olds. Like with the stability of attachment behavior, there is some controversy surrounding the relationship between sensitivity and security of attachment (Lamb, Thompson, Gardner, Charnov, & Estes, 1984; Lamb, Thompson, Gardner, & Charnov, 1985). Intervening events may obscure or change the effects of earlier experiences. Thus, it would seem advisable to test whether there is a relationship between a contemporaneous measure of sensitivity and security of attachment. Twenty-four mother-child dyads (mean age of children 24.7 months) were invited to come to the laboratory for a free play session lasting 8 minutes. The sessions were videotaped. Afterwards two observers made narrative records of all relevant aspects for maternal behavior, which was then rated using the scales for sensitivity developed by Ainsworth et al. (1974). Two scores were given, one for each period of 4 minutes. Interobserver agreement was .89. One week later these same dyads were observed again now in the Strange Situation. Classifications were made by a trained observer who was unaware of maternal sensitivity scores. Mothers of securely attached (B-) children were compared with those of insecurely attached (both A- and C-) children on the summated sensitivity scores. They differed considerably in the expected direction (T=2.34; p<.02; Goossens, Plomp, & Smeets, 1985).

Maternal sensitivity. The measure for maternal sensitivity has already been introduced above. Goossens, Plomp and Smeets (1986) undertook to validate these rating scales scores with a number of time-sampled concrete behaviors derived from Watts, Barnett, Apfel, Halfar, & Kearse (1973). Their observational system was meant for describing interaction techniques of adults with children between 1 and 3. These techniques can be seen as encouraging, neutral or discouraging. A positive relationship was expected between sensitivity and encouraging techniques on the grounds that such techniques are supportive of the child and offer it an opportunity to master the environment (cf. Matas, Arend, & Sroufe, 1978). Discouraging techniques were expected to have the opposite effect. No expectations were formulated in relation to neutral techniques. The concrete behaviors were scored by new observers who had no prior knowledge of the maternal sensitivity scores. The following behaviors were scored: didactic teaching, justification, positive reinforcement or affection, focusing, providing service or assistance (all these are encouraging techniques), general information-giving, general information-asking (a new technique we ourselves developed) changing location (all these are neutral), suggestions/commands, distraction or ignoring and refusing help (all discouraging or restrictive techniques). Intercoder agreement for these behaviors ranged from 78% to 97%. The total sample consisted of 46 mother-child dyads. These behaviors were entered into a regression analysis with maternal sensitity as the dependent variable. Three behaviors were found to contribute to the regression equation: these were (in order of largesse) distraction/ignoring (negatively), suggestions/commands (negatively) and didactic teaching (positively); $R^2=.53$; $p<.000$; for more details I refer to Goossens et al., 1986).

Recruitment of respondents. Single-earner families had to meet the following two criteria in order to be eligible for participation: 1) the father had to be the sole breadwinner and 2) the mother had to stay at home to run the household and care for the children. In dual-earner families both partners had to be employed for a minimum of 15 hours per week, while the children had to receive supplementary care in a day-care center for a similar amount of time during the week, and have been in the center for at least 3 months prior to the time of measurement. Families of both types had to be intact. Traditional families were approached directly by letter (after the local council had supplied addresses). Response rate was 37%. Non-traditional families received a similar letter through management of day care centers. Response rate was 47%. Non-respondents from traditional families were more often from the lower socio-economic strata, but no such differences were found in relation to respondents and non-respondents from non-traditional families.

The procedure

An appointment was made with all subjects for observation in the laboratory (either a Strange Situation or both a free play situation and a Strange Situation, in which case the free play situation preceded the S.S. by a week on average). Observation was always scheduled as closely as possible to the child's second birthday. Following observation, the mothers were given 2 questionnaires to be filled in by herself and her husband at home. They were requested to send these back as soon as possible and were sent a reminder if they had not done so after 3 weeks. Due to some technical problems and some subjects no longer meeting the criteria (divorce, less working hours), some data were incomplete or no longer pertinent. This report is based on questionnaire data from 77 families (41 single-earner and 36 dual-earner families), the patterns of attachment of the children toward their mothers and the sensitivity of 42 mothers as rated in a free-play situation.

RESULTS

The families

Do traditional and non-traditional families differ? In order to answer that question, they were compared by means of a canonical discriminant analysis on the following characteristics: sex of children involved, their weight at birth, hospital stays, number of children, socio-economic status, overnight separations, monthly use of sitter, career orientation, extended context, division of caregiving between partners, division of playing between partners, difference score between partners in attitude towards female social role and maternal discrepancy score. The first three variables were introduced at a higher inclusion level, but no further ordering was used for the remaining variables. The rationale behind this strategy is that the first three variables are not likely to be influenced by maternal employment, while the others may be so influenced and may also influence each other. A canonical discriminant analysis yields one (or more) discriminant functions on which the predetermined groups differ. These discriminant functions are linear combinations of the original variables that form dimensions along which the groups defined by categorical variables (here: traditional versus non-traditional families) are maximally separated. Roughly speaking, the canonical discriminant analysis should answer the following question: is there a subset of the original set of variables that yields nearly the same effects as the original set? The results are presented in Table 1, showing the standardized canonical discriminant function coefficients. The first coefficients are the multivariate statistics indicating the value of a selected variable, taking into account the relative contribution of the other variables selected. However, if the intercorrelation of two variables is high, the magnitude of the two corresponding weights may be lower than the weight of a poorer variable. Huberty's index takes account of this problem of collinearity between a selected variable and other variables. (Huberty, 1984). The structure coefficients indicate the bivariate correlations of selected variables with the discriminant function.

Table 1
Results of canonical discriminant analysis: single-earner families versus dual-earner families (n=77)

Dependent discriminant variables	Standardized canonical discriminant function coefficients		Huberty's index		Structure coefficients	
career orientation	-.95	(1)	.77	(1)	-.78	(1)
difference score in attitude towards the female social role	.40	(2)	.34	(2)	,24	(2)
number of children	.40	(3)	.32	(3)	.14	(3)
extended context	.31	(4)	.25	(4)	.17	(4)
division of caregiving between partners	.28	(5)	.18	(5)	.19	(5)
canonical correlation	.86					
Wilks' Lambda	.25					
Chi-square	99.81					

As is apparent from Table 1, the canonical correlation is .86 (Wilks' Lambda =.25; chi-square =99.81; df =5; p=.000). Using the group covariance matrices of the canonical discriminant function, 97.4% of the cases could be classified correctly. All traditional families were classified correctly, and 34 out of 36 non-traditional families. The (subset of) variables that contribute to the canonical discriminant function can readily be seen. Career orientation has by far the highest weight, and remains the highest after correction. Next come the difference scores in attitude towards the social role of women and number of children, followed by extended context and the division of caregiving between partners. Working mothers are highest on career orientation, they share a more or less egalitarian outlook on the social role of women with their partners, and also seem to divide the caregiving tasks more or less equally. Traditional families have more children, and these children more frequently have the opportunity to 'socialize' with others from the social network of their parents.

The results confirm the expectation that traditional and non-traditional families are not equivalent. Attitudinal differences in particular (career orientation, outlook on the social role of women) and family composition contribute strongly to the discriminant function. To complete the picture, we report the univariate differences. They were found for number of nights away from home (F =7.64; p<.01; children from non-traditional families scored higher), career orientation (F =134.8; p<.000); extended context (F =6.55; p=.02), difference score in attitude towards the social role of women (F =12.58; p<.001), socio-economic status (F =20.17; p<.000; non-traditional families are from the higher socio-economic strata), number of children (F=4.57; p<.04), and for division of caregiving between spouses (F=8.08; p<.01). Non-parental care was not included as it would greatly inflate the results.

The children

If the families differ to such a large extent, what about their children? The focus is on quality of attachment and on attachment behaviors. First, I will deal with the attachment behaviors.

Attachment behaviors. The relevant interactive rating scale scores (for behavior in the Strange Situation) were summated over the two reunion episodes and subjected to a multivariate analysis of variance, with maternal employment status and sex of children involved as factors. The Manova was combined with a step-down analysis (Roy-Bargman). Since such a step-down procedure treats the first variables as covariates when testing the effect of later variables, the ordering of the variables is important. Priority was given to the antithetical scale scores (resistance and avoidance) as these have greater ecological validity and supply more information on the quality of the attachment relationship. However, which of these two should take precedence cannot be argued on a priori grounds, so at least two orders are possible. As to the thetical attachment behaviors, the choice is less problematical. Proximity seeking should take the third place and contact maintaining the last, as this score may add information over and above that supplied by proximity seeking, but not the other way around.

In Table 2, means and standard deviations are given for the summated rating scale scores by sex and working status. The various effects are presented at the bottom of Table 2.

Table 2
Cell means and standard deviations of summated interactive scores (Episodes 5+8) by working status and sex

working status	sex*	n	R		A		PS		CM[1]	
			$\bar{X}$	s.d.	$\bar{X}$	s.d.	$\bar{X}$	s.d.	$\bar{X}$	s.d.
nonworking	female	22	3.7	1.5	6.3†	2.5	6.9	2.7	3.8	2.8
working		20	3.-	1.2	5.9	1.9	5.5	2.3	3.2	2.7
nonworking	male	19	4.8°	2.-	4.5	1.6	7.6$	2.7	5.3ϕ	3.9
working		16	4.8	2.5	5.8	2.-	5.8	2.2	3.1	1.7

[1] R = resistance, A = avoidance, PS = proximity seeking, CM = contact maintaining.
* significant multivariate main effect for sex (*p*=.001)
° significant (univariate) effect for resistance (*p*=.001; Roy-Bargman)
† significant (univariate) effect for avoidance (*p*=.021; Roy-Bargman)
$ significant (univariate) effect for working status (*p*=.008; Roy-Bargman)
ϕ significant univariate effect for working status (*p*=.022)
Effect indicators always located next to the higher values.

There were no significant interaction effects. A main effect was found for sex. Inspection of the univariate differences revealed that the males were somewhat more resistant, while the females were more avoidant. This effect also shows up in the Roy-Bargman step-down analysis. There was no multivariate main effect for working status, but univariate *F*-tests revealed that children of housewives scored higher on proximity seeking and contact maintaining. In the Roy-Bargman step-down test this effect remains for proximity seeking only. The sex effect for resistance is not surprising. We encountered it earlier in connection with sex and age differences in the Strange Situation. It seems to be present irrespective of the working status of the mother. The somewhat higher avoidance of the females (again irrespective of working status) is new. A different ordering of the variables (with avoidance first) produced the same results.

Quality of attachment. In testing for differences between the children from the two types of families at the level of the Strange Situation classification, three different strategies were followed. In the first strategy, only a distinction is made between secure (B-) patterns of attachment and insecure (either A- or C-) patterns. In the second strategy, a more refined distinction is made between A-patterns, B1-3-patterns and B4+C-patterns. In other words, the B4- and C-children are lumped together as childen who display a fair amount of resistance. Various reasons underly this strategy; a) we found (as expected) that children classified as B4 or C could be discriminated from the others on a measure for 'perceived security in daily occurring stressful situations' (Van IJzendoorn, Tavecchio, Goossens, Vergeer, & Swaan, 1983); b) when subjecting the classifications, the interactive scores and measures for crying and exploratory manipulation to a three-mode component analysis the B4- and C-children were seen to occupy the same region in a two-dimensional space (Van IJzendoorn, Goossens, Tavecchio, & Kroonenberg, 1985); c) B4- and C-children have higher resistance scores than any of the other subclassifications, although the B4-children are lower on resistance than the C-children; d) B4- and C-children are lower on exploratory manipulation, while B4-children cry more and use more vehement modes of expressing their distress. These results led us to describe the B4-children as "dependently attached" (Van IJzendoorn et al., 1985). This strategy of combining the B4-children with the C-children also has its predecessors (Connell, 1977; Hazen & Durett, 1982; Sagi, Lamb, Lewkowicz, Shoham, Dvir, & Estes, 1985). However, these authors combined B4-children with the C-children on a priori grounds, while we have some empirical data to support the equivocal status of the B4-children. In a third strategy, the B4-children were set apart from the B1-3 children.

Now we are left with nominal data (classifications) and 2 factors (maternal employment status and sex of the children involved). These are represented by means of multidimensional contingency tables and are usually analyzed with the use of loglinear models (see Bishop, Fienberg, & Holland, 1975). It is possible to compare and test models for the observed (log-)

frequencies including a different number of interactions terms. The choice for the most appropriate model is based upon three principles, i.e., parsimony, goodness of fit and interpretability (Fienberg, 1980; Berenson, Levine, & Goldstein, 1983). The three-way contingency table that formed the basis for our various analyses is presented below.

Table 3
Three-way contingency table depicting Strange Situation classification by maternal employment status and sex of the children

		A	B1-3	B4	C
nonworking	female	6	11	5	0
working		4	15	1	0
nonworking	male	1	8	7	3
working		2	10	3	1

One-way marginals
classification: 13 (A), 44 (B1-3), 16 (B4), 4 (C)
sex: 42 (females), 35 (males)
employment status: 41 (nonworking), 36 (working)

B / non-B patterns. It can readily be seen that the cells for non-B patterns are only modestly filled. The preferred model assumed independence between classifications (B/nonB), sex of the children, and working status of the mothers. There do not seem to be any differences in security of attachment by maternal working status of the mother or sex of the children involved. These results appear to be in line with those of others who compared Strange Situation classifications of day-care reared and home-reared children (Vaughn et al., 1980). However, these authors also report differences when looking more specifically at the actual patterns of (insecure) attachments displayed in the Strange Situation.

A / B1-3 / B4+C patterns. The preferred model assumes independence of working status, and an interaction between patterns of attachment and sex of the children involved. Females are more often classified as A-children, while the males are more often found among the B4+C-category. Fisher's exact test shows the association between sex of children and patterns of attachment after collapsing over working status to be significant (chi square =7.85; df=2; $p<.02$). The results are in line with those of the Manova on the interactive rating scales.

B1-3 / B4-patterns. The preferred model assumes sex of the children to be independent of either the working status of the mother (as could be expected) or (sub)patterns of attachment, but indicates that there is an interaction between (sub)patterns of attachment and maternal status. Fisher's exact test reveals that the association between (sub)patterns of attachment and mother's working status (after collapsing over sex of the children) is significant (chi-square = 4.76; df = 2, $p<0.05$). The (sub)patterns of attachment, characteristic of children from working mothers are somewhat more often of the B1-3-type, while the children of homemaking mothers are more often classified as B4. To end this paragraph, an overview of the tests, models and results is presented below in Table 4.

Table 4
Overview of tests, models, and results

Test	model	df	G^2	p	X^2	p
B / non-B	S,A,W	4	.53	.97	.53	.97
A / B1-3 /B4 + C	SA, W	5	6.83	.23	6.51	.26
B1-3 /B4 + C	AW, S	6	2.60	.46	2.55	.47

S = sex; A = attachment classification; W = working status

The mothers

Do these mothers differ in the quality of interaction offered to their children? In order to answer that question, maternal sensitivity scores, as rated in a free-play situation, were subjected to an analysis of variance with employment status and sex of the children as factors. There were no differences in sensitivity between working mothers and non-working mothers, nor did these mothers behave differently to their sons than to their daughters. No interaction effect between working status and sex of the children was found.

Characteristics of patterns of attachment

To what extent can the patterns of attachment as displayed in the Strange Situation be understood in terms of the other variables measured? In other words, is it possible to isolate variables that are associated with certain patterns of attachment? That, in a nutshell, is the central question of this section. I will again return to the use of canonical discriminant analysis, since the Strange Situation classifications are categorical data. The hierarchical order of introducing the variables has been changed, however, because the independent variable is different. The variables were ordered as follows: 1. sex of children, weight at birth, socio-economic status (these are data given at the time of birth and not likely to change from then on); 2. hospital stay (this pertains to an event that is independent of any parental decision, but may strongly affect the pattern of attachment); 3. the remainder of the variables which were not subjected to any further ordering because they may all influence each other. Three strategies were followed based on a distinction between secure and insecure patterns, between avoidant, secure, and dependent plus resistant patterns, and finally between secure and dependent patterns. All analyses were carried out separately for each type of family.

Secure versus insecure patterns of attachment. In neither the traditional nor the non-traditional families could a canonical discriminant function be found that effected a significant distinction between B and non-B patterns of attachment. There were no univariate differences in either of the two canonical discriminant analyses. It does not seem possible to discriminate between B and non-B patterns of attachment on the basis of the variables measured.

Avoidant versus secure versus dependent/resistant patterns of attachment. In Table 5, the results can be found for single-earner families of the hierarchical canonical discriminant analysis with the abovementioned patterns as independent variables.

As is apparent from Table 5, the canonical correlation of the first function is .63 (Wilks' Lambda =.41; chi-square =30.71; $p<.02$). This function sets apart the securely attached B1-3 children from the others. The second function is not significant, although it approaches significance (canonical correlation =.56; Wilks' Lambda =.68; chi-square =13.19; $p<.07$). It sets apart the A-children from the others. Using the group covariance matrices of the canonical discriminant functions, 71% of all cases could be correctly classified. One univariate difference was found for hospital stay (F =3.66; $p<.05$).

The results for the dual-earner families are less attractive. Both functions failed to reach significance, although the first one showed a trend towards significance (canonical correlation =.67; Wilks' Lambda =.46; chi-square =23.5; df

Table 5
Results of hierarchical canonical discriminant analysis: A-children versus B1-3 children, versus B4+C-children; single-earner families (n=41)

Dependent discriminant variables	Function 1						Function 2				
	Stand. Can. corr. coeff.		Huberty's index		Struct. coeff.		Stand. Can.* corr. coeff.		Struct. coeff.		B4+C
hospital stay	-.96	(1)	.42	(1)	-.46	(1)	.31	(6)	.33	(4)	.2
number of nights away from home	.74	(2)	.29	(4)	.43	(2)	-.47	(3)	-.25	(5)	12.0
sex of child	.71	(3)	.35	(3)	.32	(3)	.43	(4)	.44	(1)	5.0♀
use of sitter	-.65	(4)	.39	(2)	-.17	(6)	-.19	(8)	-.22	(6)	7.0
career orientation	.18	(5)	.13	(5)	.06	(8)	.32	(2)	.38	(3)	3.6
weight at birth	-.15	(6)	.07	(7)	.27	(5)	-.26	(7)	-.19	(7)	35.0
number of children	.14	(7)	.09	(6)	-.08	(7)	-.68	(1)	-.42	(2)	1.9
socioeconomic status	.10	(8)	.06	(8)	.29	(4)	.36	(5)	.05	(8)	3.9
Canonical correlation	.63						.56				
Wilks' Lambda	.41						.68				
Chi-square	30.71; df=16; $p<.02$						13.19; df=7; $p<.07$				

* Huberty's index not computed for function 2.

=14; $p=.053$). The first function sets apart the B4+C children from the others, but 4 out of 5 are B4-children; the second function sets apart the A-children from the others. Using the group covariance matrices of the canonical discriminant functions, 67% of cases were correctly classified. No univariate differences were found.

These analyses are only partly successful. In the subgroup of single-earner families it was possible to isolate the (securely attached) B1-3 children from the others on the basis of 3 separation variables and the sex of the children involved. These children have been in the hospital more often, have spent less nights away from home, take an intermediate position on use of sitter, and seem to be about evenly distributed over the sexes. It would appear that separation variables are, as expected, important in connection with children from single-earner families.

Secure versus dependent patterns of attachment. Table 6 depicts the results of the hierarchical canonical discriminant analysis for the single-earner families, while Table 7 does the same for the dual-earner families.

Table 6

Results of hierarchical canonical discriminant analysis: B1-3 children versus B4-children; single earner families (n=31)

Dependent discriminant variables	Function 1 Stand. Can. corr. coeff.		Huberty's index		Struct. coeff.	
hospital stay	-.94	(1)	.32	(2)	.54	(1)
use of sitter	.76	(2)	.43	(1)	.21	(5)
nights spent away from home	-.50	(3)	.25	(3)	-.30	(4)
division of playing between parents	-.35	(4)	.10	(5)	.04	(6)
weight at birth	-.28	(5)	.10	(6)	-.42	(2)
socio-economic status	-.24	(5)	.14	(4)	-.35	(3)
Canonical correlation	.67					
Wilks' Lambda	.55					
Chi-square	15.32; df=6; $p<.02$					

As is apparent from Table 6, the canonical correlation is .67 (Wilks' Lambda =.55; chi-square =15.32; df =6; $p<.02$). It is possible to distinguish between the B4-children and the other B1-3 children on the basis of the variables measured. Using the covariance matrix of the discriminant function, 87% of all cases could be classified correctly. All B4's were correctly classified. One univariate difference was found for hospital stay ($F=6.76$; $p<.02$). Variables with the highest indices are use of sitter, hospital stay and nights spent away from home. Again, it is the separation variables that turn out to be important.

The canonical correlation in Table 7 is .67 (Wilks' Lambda =.54; chi-square =14.3; df=7; $p<.05$). It is also possible to distinguish between B1-3 children and B4 children within the subgroup of dual-earner families. Using the group covariance matrix of the discriminant function, 86% of the cases were correctly classified. One univariate difference was found for division of caregiving between the parents ($F=4.83$; $p<.04$).

In both single and dual-earner families it is possible to isolate variables that effect a distinction between children with a B1-3 pattern of attachment and those with a B4-pattern. In single-earner families, the canonical discriminant function

Table 7
Results of hierarchical canonical discriminant analysis: B1-3 children versus B4 children; dual-earner families (n=29)

Dependent discriminant variables	Function 1					
	Stand. Can. corr. coeff.		Huberty's index		Struct. coeff.	
sex of child	-.87	(1)	.50	(1)	-.27	(3)
division of caregiving	.82	(2)	.23	(6)	.46	(1)
difference score in attitude towards the female social role	.56	(3)	.26	(3)	.18	(6)
socio-economic status	-.56	(4)	.31(2)		-.27	(3)
number of children	.56	(5)	.25	(4)	-.11	(7)
division of playing between parents	-.49	(6)	.20	(7)	-.18	)5)
discrepancy score	.47	(7)	.24	(5)	.21	(4)
Canonical correlation	.67					
Wilks' Lambda	.54					
Chi-square	14.3; df=7; $p<.05$					

consists predominantly of separation variables, while in dual-earner families it would appear that predominantly task-division variables contribute to the discriminant function.

DISCUSSION

In order to detect whether single-earner and dual-earner families differed, a hierarchical canonical discriminant analysis was performed. The results largely confirmed the expectation that these families differ in a number of respects. In non-traditional families we find mothers who are highly career oriented and who share a more or less egalitarian view on the female social role with their husbands. This is supported by a more or less equal division of caregiving tasks between spouses in these families. Characteristics of traditional families are the greater number of children and the more frequent socializing of these children with other adults from the informal network of their parent's acquaintances. The results are as expected and make sense.

Career orientation. Because of the higher educational background of working mothers (non-traditional families are from the higher socio-economic strata), the jobs available to them are intrinsically more interesting and satisfactory, which may explain the higher career orientation found.

Attitude towards the female social role. In general, husbands of working wives are more in agreement with their wives on equality of the sexes than husbands of homemaking wives. It is impossible to demonstrate whether attitude precedes actions or the other way around (that is, with the design used). It may be that husbands become more convinced of the equality of women because of their own experience with a working wife (Huber & Spitze, 1981), or that they already hold egalitarian views, on the basis of which they were quite prepared to facilitate outside employment of their spouses. Most likely both processes are at work. It must be pointed out, however, that in both types of family, the husbands were less egalitarian-minded than their wives.

Division of caregiving between partners. A more active participation in caregiving on the part of the father in the dual-earner families is part of a flexible arrangement. The wife is enabled to involve herself in outside employment because she can rely on the support of her husband. For the husband this means a deviation from a more traditional role, along the lines depicted by Young and Willmott (1973). There is more diversity in roles played by husbands of working wives. It may well be that these differential and flexible arrangements are the compensatory strategies that Hoffman (1979) suggests dual-earner families use to counteract any detrimental effects of their absence.

It has been suggested by Gold and Andres (1978a,b) that in dual-earner families parents may be more similar to one another in parent-child interactions than is the case for single-earner families. This study certainly seems to suggest that this may, indeed, be the case. It does not mean, of course, that mothers in traditional families do not play with their children, only that they play at different hours during the day and enable their husbands to play upon returning home from work. They have their own flexible arrangements. In non-traditional families, caregiving and playing are shared equally.

Number of children. In traditional families, there are more children. This is hardly surprising. The more children one has, the more difficult it becomes to combine work and caring for the children (Russell, 1983).

Extended context. There are two reasons why children from traditional one-earner families come more often into contact with the extended context: a) their mothers are likely to have more time to go visit friends and relations, or be visited by them, and b) it may be their strategy to expand the number of contacts with conspecifics for the sake of the child. Most likely, both reasons play a role.

Behavior in the Strange Situation. Here I end the discussion of the differences between single-earner and dual-earner families. I now turn to the behavior of their respective children.

On the summated interactive rating scales a significant main effect due to sex was found. Male children displayed more resistant behavior, while the females were more avoidant. The (univariate) effect for resistance was somewhat more pronounced than for avoidance. At the level of classification, we did not find any effects when distinguishing between B and non-B children. A more refined test in which patterns of attachment of A-children, B1-3 children, and B4+C children were distinguished showed an interaction effect between patterns of attachment and sex, thus confirming the results on the rating scale scores. Males more often had a B4 or a C-pattern (but predominantly a B4-pattern, since there were very few C-children in the sample), while the females were more often associated with an A-pattern. Setting apart the B4-children, an interaction between working status and patterns of attachment appeared indicating that B4-children tend to be more often from traditional families.

Resistance of the males. As in our larger sample, the males were more resistant. I maintain my earlier interpretation that this may be due to their greater fragility (Egeland & Farber, 1984). They are more upset. This then changes into resistance to the mother upon her return.

Avoidance of the females. This effect is not so easily explained. It was not found in the larger sample, neither at the level of the rating scales nor at that of the classifications. We have already pointed out (Goossens et al., 1985) that sex differences provide an inconsistent picture, and that the only sex difference which has been reported with some consistency is the one discussed above, i.e., the somewhat greater anxiety of the male children. Of course, there is a difference between this sample and the larger one, but nonetheless the results remain inconsistent.

Pending further research and more consistency in the results, an interpretation of this particular finding does not seem warranted.

More traditional children are B4. My explanation is that children of working mothers are less vulnerable to slightly stressful situations, characteristic of the Strange Situation, because they are used to the daily occurrence of separations. Is there support for such an explanation? Hock and Brookhart Clinger (1980) claim that their one-year olds with a more positive approach towards the stranger in episodes 3, 4 and 7 had mothers with a less exclusive investment in the maternal role. These mothers did not see themselves as wholly indispensable to their children, and consequently were more confident of other caregivers' capabilities. The authors assumed that the more resourceful behavior of these children was the result of having been subjected to a greater variety of experiences. Although the authors do not elaborate on this point, they think it might be more of a challenge for children having to cope with mildly stressful situations in the context of a warm and loving relationship. In other words, although the mothers of B4-children are (presumably) sensitive, they might differ in the degree to which they are prepared to confront their children with challenges. In line with their status (i.e. working or non-working), these mothers may have been tempted either towards exposing their children to challenging confrontations, thereby increasing the child's independence, or towards a more protective attitude, perhaps leading to more dependent behavior. Put differently, children of housewives have different experiences than children of working wives. The former have more experiences adapted to them, the latter have experiences they must adapt to: separations in a day-nursery.

Resch (1975) claims that "from the small daily life separations in familiar settings with familiar people - at whatever age - grows the capacity to separate from the mother and to develop modes of coping, however successfully, with the larger demands required in major separations into unfamiliar settings with unfamiliar people" (op.cit., p.31). Damsté (1983) claims that early exposure to mild forms of stress might be conducive to an early mastery of these forms of stress, while no exposure or too much exposure might have disadvantageous effects. It may be assumed that visiting a day-care center is a mild form of stress, involving separations from the mother but also reunions with caregivers in a familiar environment. The results of Roopnarine and Lamb

(1978), who found their day-care children initially upset, but equally secure at a second observation three months later, support this view. In her ethological observations of separation behavior in a day-care center, Resch (1975) found many indications of a growing resourcefulness among children in managing these separations, especially through relating to caregivers and through play. In our view, there is some support for the assumption that day-care children may be less vulnerable to separations, simply because "their emerging capacity to separate" has been better trained (op.cit., p.185).

Maternal sensitivity. Finally, I did not find any differences in sensitivity between working and non-working mothers. Sex of the child did not seem to have an effect either, nor were there any interaction effects. In view of the presumed relationship between sensitivity and the organization of attachment behavior, it may seem surprising that I did not find any association between sensitivity and sex of the children. After all, I did find sex effects both for the antithetical rating scale scores for resistance and avoidance and for the classifications. It must, however, be remembered that the majority of the males showing resistant behavior in the Strange Situation were finally classified as B4-children, whose mothers are supposed to be reasonably sensitive in interaction with them. In fact, Bell (1970), who suggested adding this new classification to Ainsworth and Wittig's (1969) classification system, did this on the basis of sensitive maternal behavior. Rather than creating a new category for anxious attachment patterns, she found indications that a more or less serious separation might have caused the frightened behavior of these children. The very absence of differences in maternal sensitivity in relation to males and females reinforces us in our opinion that the greater avoidance of our female subjects is an unusual result which eludes interpretation.

The findings of Vaughn et al. (1980) were used to bolster our argument that the sensitivity of working mothers might under certain conditions be at risk. These conditions, however, do not seem to have emerged in this sample. We have already seen that in dual-earner families there is a more egalitarian division of tasks, largely due to the fathers' contributions to caregiving. This then enables the mothers to play with their children. Play is a particularly important type of interaction. It usually involves two interactants, provides ample opportunity to get acquainted, and thus may contribute to sensitivity, which is likely to be acquired in this context of happy interaction. In play one discovers a much wider range of behavior than in the context of caregiving, which is much more routine (Van IJzendoorn, Vergeer, & Van Vliet-Visser, 1984).

Characteristics of secure and insecure patterns of attachment. The results support to only a moderate extent the expectations formulated prior to the study. For neither single-earner nor dual-earner families was it possible to find a discriminant function that separated B and non-B patterns of attachment, although in the sub-group of dual-earner families a trend did emerge. Neither were there any univariate differences. The lack of success of these canonical discriminant analyses is perhaps best explained by the fact that in lumping together the A- and C-patterns of attachment, we are not doing sufficient justice to the behavioral patterns displayed in the Strange Situation. After all, A-children behave as if they are relatively unaffected by the stress induced by the Strange Situation, while C-children become very upset. It seems reasonable to assume that different factors may be held responsible for these differential behavioral patterns.

Avoidant, secure and dependent/resistant patterns of attachment. There is some support for this explanation, since when discriminating between A, B1-3 and B4+C patterns, it was possible to discriminate the securely attached B1-3 children from the others in the sub-group of single-earner families. However, in the subgroup of dual-earner families, this finding was not replicated. There we only found a trend toward significance for the canonical discriminant function distinguishing the B4+C children (*n*=5; only 1 C-child) from the others. The canonical discriminant function setting apart the home-reared B1-3 children from the others consists predominantly of separation variables and sex of the children. These B1-3 children had been in the hospital more often, had spent fewer nights away from home, took an intermediate position in use of a sitter and male and female children were about equally represented. Thus we see that precisely these securely attached children are characterized by the occurrence of a major separation (i.e. hospital stay). It should be remembered, however, that a mother who stays at home is in a position to counteract the potentially harmful effects of such a separation by her constant and renewed availability and attention. The fact that these children had a low score on "overnight separations" points in this direction. It seems likely that these mothers have realized the effects of such a major separation as a hospital stay and may have decided to minimize other separations that might affect their children's attachment behavior. Hoffman (1979) claims that working mothers compensate for their absence during the day by offering high quality interaction upon arriving home. We have reported on results indicating support for her point of view. Something similar may take place in traditional families when the child has been hospitalized. Here, the parents are wary of subjecting their children to another situation of unavailability, i.e. spending a few nights away from home. Given that mothers of B1-3 children are supposedly sensitive, they must be considered capable of an accurate perception of their child's behavior and what may have caused it. The finding that males and females are classified as securely attached in about equal measure, is in line with the earlier result that maternal sensitivity and sex of the children are not related. These securely attached children are sometimes left in the care of a sitter at night, but not very often.

It was not possible in either of the two subgroups to discriminate between A-children and the other groups on the basis of the variables measured.

Security versus dependence. Canonical discriminant analyses were performed comparing the B1-3 children with the more dependently attached B4-children, for both sub-groups. The canonical function discriminating between traditionally reared B1-3 children and their B4 counterparts consists predominantly of separation variables. Use of a sitter at night had the highest index, followed by hospital stay and nights spent away from home. While the secure traditionals had been in the hospital and had somewhat more often been left in the care of others at night (babysitters), they had not spent a great number of nights away from home. The B4-children scored highest on this last variable, which, as we have indicated before, represents an unpredictable separation (for the child), set in motion by the parents. Thus, like Bell (1970), we find indications for the occurrence of major separations in the background of our B4-children. It is precisely because such separations as nights spent away from home are induced by the parents themselves that they may be uninclined to discern any potentially detrimental effects in their children's behavior. Also nights spent away from home may be a more severe separation for home-reared children than for their day-care reared counterparts, since separations are not part of the former's daily routine.

The canonical discriminant function distinguishing between day-care reared B1-3 children and their B4-counterparts does not focus on separation variables but on other variables (in order of importance): sex of children involved, socio-economic status, difference score in attitude towards the female social role, family constellation (number of children), maternal dissatisfaction (discrepancy score), task division variables (division of caregiving), and division of playing. While the securely attached B1-3 children are about evenly distributed over the sexes (15 females versus 10 males), their dependently attached counterparts are predominantly male (3 males out of 4; there were very few B4-children in this sub-group). The B4-children are from the higher socio-economic strata and from somewhat larger families. In line with Meynen (1977), the attitudinal differences on the social role of women are small. Maternal dissatisfaction is low in these families. As regards the division of tasks, these families seem to be truly non-traditional. At the hours measured we find the mothers more involved in playing and the fathers more in caregiving, while their counterparts with B1-3 children seem to divide these tasks more equally, thus showing a wider range of activities. Pederson, Cain, Zaslow, and Anderson (1980) claim that dual-earner fathers' interaction is limited almost solely to caregiving. On the whole, this is not our finding, but the picture seems to be an adequate reflection of what happens in dual-earner families with B4-children. The fact that B4-children are predominantly male is not surprising; this was found throughout, although in single-earner families it seemed to have been overshadowed by other factors. The B4-children from non-traditional families seem to receive predominantly one type of interaction from their mothers, playing, which in itself is quite varied, but apparenty not supplemented sufficiently with caregiving. It is possible that precisely a combination of different types of interaction (i.e., both caregiving and playing) effect a secure attachment of the B1-3 type.

CONCLUSIONS

Evidently, the results reported provide considerable support for the expectations formulated in the hypothetical framework. I think a few conclusions can be drawn which may be important for this research field:

1. Single-earner and dual-earner families are different types of families that make their own arrangements concerning task division and caregiving of the children.
2. On the basis of a simple distinction between B and non-B patterns, it is not possible to find differences between children who are cared for at home and their counterparts who receive supplementary care (Vaughn et al., 1980; Eas-

terbrooks & Goldberg, 1985). This result has now been replicated in different cultural circumstances. However, it is possible that a more refined distinction in patterns of attachment does produce differences that may be meaningful. Vaughn et al. (1980) reported more A-children among those who started receiving supplementary care at an early age, while here it was found that traditionally reared children more often display a B4-pattern, which may have been caused by their lack of experience with regular separations.

3. According to attachment theory, separations play an important role in determining the patterns of attachment behavior. While it seems likely that regular alternative care does not need to be conceived of as separation in the traditional sense, the potential influence of other separations and social experiences need to be taken into account in studies such as these. Overnight separations and hospital stays in particular remain influential. However, it is also obvious that the hypothetical framework has been less successful in predicting the conditions under which we obtain A, B or C-patterns of attachment. One can only hope that continuing research efforts will bring more clarity on this issue of maternal employment and day care.

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ATTACHMENT IN SOCIAL NETWORKS
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CHAPTER 5

ATTACHMENT THREE YEARS LATER. RELATIONSHIPS BETWEEN QUALITY OF MOTHER-INFANT ATTACHMENT AND EMOTIONAL/COGNITIVE DEVELOPMENT IN KINDERGARTEN [1]

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ABSTRACT

In this longitudinal study, we describe (dis-)continuities between quality of mother-infant attachment and emotional/ cognitive development in kindergarten. 65 mother-child pairs participated in a Strange Situation study. Three years later mother and child were asked to participate in problem-solving tasks; parents and kindergarten teachers were asked to complete a Q-sort procedure, measuring ego-control and ego-resiliency. Attachment behavior appears one of the factors determining degree of ego-control and -resiliency; furthermore, the relationship between attachment and affective atmosphere during the problem solving tasks appears to point to some consistency in caregiver's responsiveness in the cognitive domain.

INTRODUCTION

After about one year of intensive and regular interaction, an attachment relationship between caregiver and infant develops. The quality of the relationship can be measured through the well-known Strange Situation procedure. If caregiving arrangements and family circumstances are relatively stable, the quality of attachment has been shown to remain the same through-

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out the second year of life (Ainsworth, Blehar, Waters, & Wall, 1978; Vaughn, Egeland, Sroufe, & Waters, 1979; Waters, 1978). After that, the quality of attachment cannot be measured through the Strange Situation, because children "cognitively" grow out of this intendedly stressful procedure.

Nevertheless, quality of attachment is supposed to influence socio-emotional and cognitive development of toddlers and kindergarten children, and even of older children. This influence can be explained in two ways, corresponding to two currents in attachment theory. Firstly, it is hypothesized that an internal representation of the child itself, its caregiver, and the relationship between both develops. The roots of this internal representation can be found in the first year of life, but during some years thereafter a working model develops that is supposed to be relatively "robust" to external influences. This working model of the self and its relationship to the caregiver influences the interaction with the social and physical environment. In fact, the working model functions as one of the building blocks of personality (Main, Kaplan & Cassidy, 1985).

The second explanation is not so much focused on the child's internal representation as on its environment. It is hypothesized that contextual factors lead to the formation of a bond between caregiver and infant, and that the same factors stimulate a specific way of dealing with the environment (Lamb, Thompson, Gardner, & Charnov, 1985). A sensitive and responsive caregiver stimulates a secure attachment relationship in the first few years of life, but the same kind of responsiveness - adapted to the child's developmental status - provides a good foundation for instruction of the toddler- and kindergarten-aged child. The quality of attachment itself does not directly influence later cognitive and socio-emotional development. Continuity in adaptation to environmental tasks is a matter of caregiving and other contextual factors.

Without choosing between one of these hypotheses, one may assume that securely attached children, who trust their caregiver and his/her availability in stressful situations, find an optimal balance between proximity to their caregiver, and exploration of the wider social and physical environment. Anxiously attached children, however, remain concerned about the availability of the caregiver, and their attention is therefore fixed upon the attachment person. Too little room is left for unrestrained exploration. Securely attached children indeed regularly seek proximity to the caregiver during the second year of life, but by this seemingly dependent behavior the foundations are laid for autonomous exploration of the environment during the preschool period. These children had the opportunity to develop a feeling of competence through interaction with a sensitive caregiver in infancy. This feeling of competence or self-reliance could also be stimulated through responsive instructions of the caregiver to kindergarten children solving difficult tasks and problems. One can imagine that a responsive caregiver is quite capable of making available for the preschool child the so-called "zone of proximal development" (see the paragraph on instruction).

In their second year of life, anxiously resistant children make a very clinging and dependent impression, and they do not seem capable of controlling their emotions. Anxiously avoidant children, however, appear to be autonomous: they do not seem to care about their caregiver even in stressful situations. From attachment theory, it can be derived that neither group of infants developed a strong feeling of security, self-reliance and competence. They therefore remain vulnerable and dependent in a developmental stage in which they have to solve problems relatively autonomously as well as having to establish new relationships with peers and kindergarten teachers (Bretherton, Bates, Benigni, Camaioni, & Volterra, 1979; Sroufe, 1979). Besides, it can be hypothesized that unresponsive caregivers of anxiously attached infants remain less sensitive to the socio-emotional and cognitive needs of preschoolers. Therefore, instructions could be of low quality, which implies less stimulants for reaching the proximal zone of development. The anxiously attached child not only made a slow start in infancy, but because of its unresponsive caregiver, it may remain disadvantaged in the preschool situation as well. The child also has no model of a harmonious relationship with its attachment person when building new relationships outside the family.

We have seen that explanations for continuity of development focus on internal representations or "personality" on the one hand, and on social context, e.g., caregiving arrangements on the other. Do stable personality traits result in continuity or is continuity a consequence of qualitatively good, i.e., responsive and continuous caregiving? It does not seem adequate to discuss the matter of developmental continuity exclusively in terms of "internal representations" or in terms of "social context". Combining both hypotheses might be a more fruitful approach to the problem of continuity. However, the question remains which factor must be emphasized: are stable caregiving arrangement and continuity in responsiveness necessary or sufficient conditions for developmental continuity? Are there interactions between changing caregiving arrangement and "internal representation" resulting in discontinuity?

In this study we have tried to do justice to both aspects - internal representation and environment- without pretending to find definite answers to the above mentioned questions. The study consists of two parts. On the one hand we will consider the quality of maternal instruction three years after measuring the quality of the attachment relationship between mother and infant. The cognitive dimension of instruction as well as the socio-emotional dimension will be taken into account. The question is whether continuity exists between quality of attachment in the Strange Situation procedure, and quality of maternal instruction three years later. On the other hand, we will study the relation between quality of attachment and development of "personality" in the preschool setting, without taking social context into account. Two aspects of personality presumably important for solving social and nonsocial problems, i.e., ego-resiliency and ego-control, will be emphasized. It is hypothesized that an optimal quality of attachment in the second year of life leads to optimal ego-resiliency and ego-control. It must be clear that we do not intend to produce crucial empirical evidence for choosing between the two hypotheses: "internal representation" or "social context". As emphasized above, a combination of these hypotheses will probably have the most explanatory power. In this study, we have only tried to consider both types of developmental continuity in attachment theory, i.e., the "internal" versus "external" continuity and have avoided making an *a priori* choice. It might be worthwile, of course, to attach different weights to these hypotheses in the event the data corroborated them to a different degree.

Be that as it may, in the next paragraph we will first describe the background of our study on the relationship between attachment and ego-resiliency and ego-control. Next, we will focus upon the relationship between attachment and maternal instruction, which is central in the second part of this study. Then the results of the study will be presented, as well as a discussion of the two parts. Lastly, both parts will be related, and conclusions will be drawn with respect to the questions introduced above.

Ego-resiliency and ego-control

Block and Block (1980) defined ego-resiliency as the competence to react flexibly, but also persistently, in problem situations. It is hypothesized that securely attached children develop a resilient approach to difficult tasks and problems, whereas anxiously attached children show more brittle responses. Block and Block (1980) consider ego-resiliency an important condition for being able to adequately solve difficult tasks in kindergarten. They provided much empirical evidence in favor of this thesis.

The quality of attachment also allows a prediction of the development of ego-control. Block and Block (1980) defined ego-control as the disposition or threshold to repress or express impulses and emotions. Kindergarten children with strong ego-control are rigid and inhibited, show anxiety in new situations and reject unexpected information. Children with a weak ego-control, however, react too "spontaneously", and do not like postponing the satisfaction of their needs. They are not capable of concentrating on one task or problem very long. Both types of ego-control - strong and weak - do not appear to be very adequate conditions for solving problems and functioning in social groups.

Although concepts like ego-resiliency and ego-control are broad, and the psychoanalytic origin is unmistakably present, Block and Block have been successful in constructing and validating an original operationalization. The measure is a Q-sort (Stephenson, 1953), consisting of 100 behavioral descriptions. These descriptions, written on small cards, have to be distributed among nine categories from "strikingly present" to "strikingly absent" (see next paragraph; Van Lieshout, Riksen-Walraven, Ten Brink et al., 1983). Studies on the validity of the CCQ (California Child Q Sort) showed that ego-resiliency and ego-control indeed influence the quality of interaction with the physical and social reality (Block & Block, 1980; Van Lieshout et al., 1983). From attachment theory it can be derived that quality of attachment in infancy is related to ego-resiliency and ego-control in kindergarten. Van Lieshout and his colleagues (1983) even suggested interpreting resiliency and control as continuous developmental dimensions which are being expressed in infancy through the quality of the attachment relationship with the caregiver. Empirical evidence, however, is relatively scarce; few (time-consuming) longitudinal studies have been done.

Waters, Wippman and Sroufe (1979) found that securely attached children three years later scored significantly higher on scales for ego-strength and social competence, as compared to anxiously attached children. Their measurements of attachment quality and ego-strength, however, were poor substitutes for validated and well-known measures like the Strange Situation and the CCQ. One is inclined, therefore, to regard this study as only a first exploration of the field.

In this respect, the study of Arend, Gove and Sroufe (1979) was more convincing: the Strange Situation procedure was used, as well as the above mentioned Q sort. Securely attached children turned out to be significantly more resilient than anxiously attached children on a Q sort completed by the kindergarten teacher. The differences, however, were very small. For ego-control, no more than a trend in the expected direction could be reported. Anxiously resistant children, expressing their emotions in the Strange Situation in an uncontrolled way through crying etc., were somewhat more undercontrolled than securely attached children. The latter children scored slightly higher than the anxiously-avoidant attached group. Resistant children tend towards undercontrol, avoidant children towards overcontrol. The sample, however, is very small (*n*=26), and the authors rightly conclude that further research, hopefully allowing for the generalization of the results, is necessary.

Sroufe (1983; Sroufe, Fox, & Pancake, 1983) studied a sample of 40 carefully selected children from disadvantaged homes, who had been seen in the Strange Situation in their second year of life. The children visited an experimental kindergarten and optimal conditions for collecting observational material were created. We shall focus here on the results of the measures for ego-resiliency and ego-control. Three teachers sorted 100 items. Sroufe computed the usual resiliency and control scores, as well as a score for dependency, on the basis of 12 of the 100 items. Securely attached children indeed were more resilient than anxiously attached children. No differences were found between the resistant and avoidant groups. Sroufe (1983) remains somewhat unclear about ego-control. He reports that the resistant and avoidant children did not differ in ego-control, but whether this also held for securely and anxiously attached children is not clear. The securely attached group appeared less dependent than the anxiously attached groups, which themselves did not differ with respect to dependency. Due to the selection of the sample, it is somewhat difficult to generalize from the results.

Dutch research on the relationship between attachment behaviors and ego-resiliency and ego-control is reported by Van Lieshout et al. (1983). Firstly, 100 children participated in an intervention study on exploratory behavior, contingency analysis and habituation speed in their first year (Riksen-Walraven, 1977). Six years later this sample was studied, using, among other things, a Dutch version of the CCQ. Secondly, 64 children who participated as two-year-olds in a study on problem solving (Van Lieshout, 1975) were observed 10 years later with the CCQ.

The first follow-up study indicated that exploratory behavior is related to resiliency at seven years of age, and that crying behavior significantly correlated with (weak) ego-control. Optimal control, computed as the absolute value of ego-control scores, could not be predicted through variables measured in the first year. From the second follow-up study it was concluded that children oriented predominantly towards the mother, seeking her proximity in the problem-solving situation and showing less anger and distress, appeared ten years later to be more ego-resilient and more optimally ego-controlled. However, these interrelations could not be observed in every subgroup of children. Details about the subgroups - boys and girls, first and later-born children - can be found in Van Lieshout et al. (1983). Accepting crying behavior, proximity seeking, and display of anger and distress as indicators of attachment, the results appear to confirm the hypothesized relationships between attachment on the one hand and ego-resiliency and ego-control on the other.

On the basis of these studies we feel justified in concluding that empirical evidence for the hypotheses formulated above is still insufficient. Waters et al. (1979) and Van Lieshout et al. (1983) only produced indirect evidence, and in the small-scale study of Arend et al. (1979) the differences found between attachment groups are very small. Sroufe's study (1983) showed that securely attached children indeed are more resilient, but the relation with ego-control is unclear. The findings are contradictory with respect to a possible differential development of ego-resiliency and control for the two anxiously attached groups. Arend et al. (1979) suggest that avoidant attachment is correlated with strong control and resistant attachment with weak control, but this hypothesis could not be confirmed in Sroufe's research. Data on the relationship between anxiously dependent attachment, the so-called B4 classification (Van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1985), and ego-resiliency and ego-control are absent, the reason for this being that in the aforementioned studies the B4 category contained too few subjects for separate analyses to be possible. We submit that the anxiously dependent group is less resilient and less optimally controlled than the other B-subcategories because of its resemblance to the anxiously resistant group (Van IJzendoorn et al., 1985).

In the first part of this study we will try to replicate and extend the existing studies on the relationship between attachment and ego-resiliency and ego-control. Our main question is whether optimally adapted two-year-old children, that is, children who have built up a secure attachment relationship, are optimally adapted in kindergarten, i.e., show much ego-resiliency and optimal ego-control. Special attention is given to differential development of avoidant and resistant types of anxious attachment and to the status of the dependently attached B4-group. Lastly, we shall have a look at the influence on ego-resiliency and ego-control of such contextual factors as working status of the mother and exceptional events, e.g., divorce or stay in hospital.

Instruction

The emphasis on ego-resiliency and ego-control as conditions for optimal problem solution seems to ignore the great importance of adequate instructions in acquiring problem-solving abilities. The child is depicted as being detached from its social surroundings, as being solely dependent on its own "internal representations" and "schemata" acquired in the past. Such an approach has met, and rightly so, with severe criticism the last few years. Bruner, for instance, criticized an approach in which the child's development is pictured as a "lone venture for the child, in which others could not help unless the child has already figured things out on his own". Somewhat maliciously he held Jean Piaget responsible for this attitude. Instead, Bruner proposed a theory in which cognitive and affective processes are seen to develop in a social context, which actively participates in moulding the child's development.

Bruner may have been inspired by his reading of the cultural-historical theory. This theory time and again underlined the central importance of the child's surroundings for cognitive development. The originator of the theory, the Soviet researcher L.S. Vygotskij, attached great importance to the adult's role in child development. In social interaction with adults the child acquires the cultural tools of its society (Van der Veer, 1985a). Within the cultural-historical school, this conception has been elaborated with respect to the concept of the "zone of proximal development". In cooperation with a sensitively operating adult, the child is able to perform certain tasks which it could not have managed independently. In the eyes of cultural-historical researchers such creation of the zone of proximal development is of paramount importance for the child's cognitive development (Rogoff & Wertsch, 1984). Various researchers are currently trying to lay bare the processes taking place in the zone of proximal development. In line with Vygotskij's original emphasis on the concept of social interaction, the focus is on the mother-child dyad. The child is dependent on the adult for its cognitive development to proceed optimally (cf. Wertsch, 1985). Attachment theory is not always very clear in explaining findings demonstrating attachment quality's great value for cognitive development. Longitudinal research demonstrated the fact that securely attached children of 2½ (Hazen & Durrett, 1982) and 5 years of age (Arend, Gove & Sroufe, 1979) are more inclined to explore the surroundings than anxiously attached children. Securely attached children are also more eager to learn, show more inquisitiveness (Waters, Wippman, & Sroufe, 1979), and display more enthousiasm during problem-solving

(Matas, Arend, & Sroufe, 1978). This higher cognitive competence may be connected with a more harmonious caregiver-child relation. Caregiver and child are so well attuned to each other emotionally that the transmittal of knowledge and abilities proceeds in a flexible way. The caregiver knows the scaffolding and freedom of action the child needs to be able to solve a problem successfully. The child in turn dares to tackle problems slightly above its level of knowledge, because it is confident of the caregiver's ability to assist at the appropriate moment (Bretherton et al., 1979).

Such a point of view is in close agreement with the cultural-historical approach. For in the Soviet approach too, we find a strong emphasis on the caregiver-child dialogue with due attention to the sensitivity required from the caregiver towards the needs and signals of the child. A sensitive caregiver can effectively create a zone of proximal development in the cognitive domain (Van der Veer, 1985a) while at the same time, by reacting sensitively towards emotional signals, create a feeling of security in the affective domain. The question is to what extent caregivers, displaying enough sensitive responsiveness for a secure attachment relation with their child to develop, are later capable of showing similar sensitivity when instructing their child in complex problem-solving tasks.

In the cultural-historical tradition, this instructional ability is usually investigated using tasks slightly beyond the child's abilities. The caregiver, therefore, has to "scaffold" the problem-solving process - subdividing and simplifying the problem - so that the child will be able to find the solution relatively independently. For this to be possible, a flexible, "smooth" interaction between caregiver and child is required. The caregiver, of course, will carry the burden of the responsibility for a smooth task performance. He or she should be acutely aware of the child's zone of proximal development in the particular domain. Both the excessive curtailment of the child's freedom of action - by providing too much prompting or demonstrating the whole solution - and a "laisser faire" attitude - in which the child is given no more than superficial encouragement - should be avoided. As in the affective domain, one has to find the optimal balance between over- and understimulation. The second part of this study aims at investigating the question whether securely attached dyads will continue to show more balanced interactions during joint problem-solving three years later.

FIRST PART OF THE EMPIRICAL STUDY: ATTACHMENT AND RESILIENCY/CONTROL

Design

At 24 months of age (range: 23 to 25 months), 77 children and their mothers were tested using the Strange Situation procedure. About 50% of the mothers were working 15 hours or more per week outside the home; the rest of them were full-time homemakers (see Goossens, in prep.). Sixty-five of the 77 children participated in the follow-up study three years later. Parents and kindergarten teachers completed the Q-sort for ego-resiliency and ego-control, validated by Van Lieshout et al. (1983) for Dutch children between 4 and 12 years of age. In the laboratory, mother-child pairs had to complete four instructional tasks, which were videotaped. The children had to complete an IQ-test, the Leiden Diagnostic Test (Schroots, 1979). In the second part of this study the results of the instruction tasks and IQ-test are reported upon. Lastly, we collected data through interviews and a questionnaire on special events in the family which had taken place during the last three years. In the follow-up study, the mean age of the children was 64 months (range: 57-72 months).

Subjects

Only 16% of the subjects did not participate in the follow-up study. Because data on the "nonrespondents" were available from the first part of this longitudinal study, we tested the hypothesis that subjects refusing to participate did not constitute a specific subsample. Both groups, respondents and nonrespondents, were compared on the following variables: attachment classification, attachment behaviors, socio-economic status and sex. Differences in means on scales for attachment behaviors (see next paragraph) were tested through *t*-tests. No differences were found to be significant ($p<.05$). The distributions of the children on attachment classifications (A+C; B1; B2+B3; B4) did not differ significantly (X^2 =.35); $p=.95$). No differences were found with respect to socio-economic status and sex of the child. Therefore, it was concluded that "nonrespondents" did not constitute a specific selection from the original sample. The way in which this original sample was selected for participation in the study is described in detail elsewhere (Goossens, in prep.).

Procedure

The Strange Situation procedure consists of eight episodes, the last seven of which should ideally last 3 minutes each. The first one is variable and usually takes less than 30 seconds. After some final instructions in this first episode caregiver and child are left in the playroom (episode 2). In episode 3, a stranger enters who after three minutes signals to the mother to leave (episode 4). In episode 5 the mother returns; she leaves again in episode 6. The stranger re-enters the room in episode 7, and in the last episode the mother returns once again. To assess the quality of the relationship, the behavior of the child is scored on six 7-point rating scales, which take into account the frequency, intensity, and latency of specified behavioral components. The scales are for proximity and contact seeking, maintenance of contact, resistance, avoidance, search behavior and distance interaction. The frequency of crying behavior and exploratory behavior is observed. The patterns of scores on the first 4 scales in the reunion episodes (5 and 8) leads to the classification of mother-child pairs in anxiously avoidant attachment (A), secure attachment (B), or anxiously resistant attachment (C). The three main groups (A, B, and C) may be further divided into various subgroups (A1, A2, B1, B2, B3, B4, C1, and C2). The securely attached group shows minimal resistant or avoidant behavior; these children are somewhat upset when their mother has left, but her return has an immediate calming effect. The children from the A- and C-groups deviate from this pattern. Some children avoid their returning mother (A), other children behave ambivalently, seeking contact but resisting the mother as well (C). The subcategories B1 and B4 have been called "marginal" groups, because their position in the classification system is not altogether clear (Ainsworth et al., 1978). B1-children show some resemblance to A-children, because of their tendency to slightly avoid the mother. B4-children have been called anxiously dependent (Van IJzendoorn et al., 1985; Sagi, Lamb, Lewkowicz, Shoham, Dvir & Estes, 1985). These children are very upset in the Strange Situation: they cry a great deal and show little exploration or playing behavior. They greet, however, their returning mother less ambivalently than C-children.

Two observers independently scored 22 randomly selected videotaped Strange Situations. The interrater reliability, computed with Pearson's *r*, was good: for proximity in the two reunion episodes, .77 and .91 respectively; for maintaining contact .95 and .97; for resistance .88 and .92; for avoidance .86 and .91. On the basis of these interactive scales, the children were classified as A, B, or C group children. The interrater agreement for this step was 95.5%; for the subcategories 91.5%. The scores on these scales and the classifications were derived from Goossens (in prep.). The interrater reliability for the scales in the other episodes and for "search" and "crying" ranged from .73 to .97. Agreement for exploratory manipulation was 78%. These scales and the behavioral patterns were scored by the first author. The stability and validity of the procedure for 24 month-old children is described elsewhere (Goossens, Van IJzendoorn, Tavecchio, & Kroonenberg, 1985; 1986).

The CCQ. Block and Block (1980) designed the California Child Q-sort to be completed by teachers and other caregivers. Van Lieshout et al. (1983) constructed a Dutch version of the Q-sort, the "Nijmegen California Kinder Sorteer test" (NCKS), and validated the instrument for Dutch children from 4 to 12 years of age. Parents, teachers or other caregivers sort 100 behavioral descriptions, written down on cards, into nine categories, from "strikingly absent" to "strikingly present". Except for the middle category, which should contain 12 cards, all categories contain 11 cards after sorting. In distributing the cards, the sorter is comparing the items, not the children. The resulting distribution is thereupon correlated with two profiles, constructed by Block and Block (1980): one profile of a child with high ego-resiliency, and one profile of a child with weak ego-control. The correlation coefficient is the score on ego-resiliency and ego-control, ranging from -1.0 tot +1.0. Van Lieshout et al. (1983) report excellent reliability and validity for the Dutch version of the CCQ.

In this study, we asked both parents and the kindergarten teachers to sort the CCQ (the children attended different kindergartens). The sorting was done individually, scores on ego-resiliency and ego-control were computed by Van Lieshout and his colleagues at the University of Nijmegen. Scores of father and mother were added: in analyzing the data, we worked with the variables "ego-resiliency" and "ego-control" as scored by the parents. Although the scores of mother and father are not highly correlated (.51 in the case of resiliency, and .70 in the case of control), and although only a modest score for consensus between both parents could be computed (.54), we think that the combined parental score is probably more reliable than the separate variables (Waters, Noyes, Vaughn, & Ricks, 1985). For that matter, the separate variables correlate very highly with the parental variables: correlations vary from .86 to .92. Besides scores on ego-resiliency and ego-control, a variable "optimal ego-control" was constructed. First the mean was subtracted from the scores on ego-control, after which absolute values were computed. Therefore, low values on the variable "optimal ego-control" indicate optimal control, and high values point to weak or strong control (see Van Lieshout et al., 1983).

RESULTS

The relation between early childhood attachment and later ego-resiliency and ego-control has been studied on the level of attachment classifications, as well as on the level of attachment behaviors. Several studies have indicated that attachment classifications only partially mirror behavioral differences of children in the Strange Situation (Lamb et al., 1985). The classifications are often comparable to a bed of Procrustes, into which not all information about attachment behaviors can be fitted. The separate behaviors, however, throw some light on the activation of the attachment system: For example, "antithetical" attachment behaviors, such as avoidance and resistance, point to anxious attachment feelings. In the next paragraph, therefore, results on the relation between classifications and ego-resiliency and ego-control are reported. The same will be done for the relation between attachment behaviors and ego-resiliency and ego-control.

Attachment classification and resiliency/control

To analyze the data we had to reduce the number of subcategories from eight to four:

- A1+A2+C1+C2 is the anxiously attached group, consisting of 8 girls and 6 boys;
- B1 is the "marginal group" of securely attached children showing some avoidant behavior (11 girls and 7 boys);
- B2+B3 is the "normative group" of securely attached children (10 girls and 9 boys);
- B4 is the anxiously dependent group, consisting of 6 girls and 8 boys.

We analyzed the data, using 2x4 analyses of covariance, with Sex and Classification as factors, and Socio-Economic Status as covariate. The ANCOVA's on resiliency (as perceived by the parents and the kindergarten teachers) did not show any significant effect of classification. Securely and anxiously attached children did not differ significantly in ego-resiliency. The results showed, however, a rather strong effect of the factor "sex of the child": girls display more resiliency than boys.

In the eyes of the parents, girls are more optimally controlled as well, but no differences were found between the four attachment classifications. The ANCOVA on optimal control, as perceived by the kindergarten teachers, resulted in a significant Sex by Classification interaction ($F(3,47)=3.3$; $p=.03$; see Table 1).

Table 1
The relation between Optimal Control (as perceived by the kindergarten teachers) and attachment quality[1]

Variable	Optimal Control		
Factor	$\bar{X}$	s.d.	n
Girls			
A/C	.261	.214	5
B1	.198	.149	11
B2/B3	.095	.093	9
B4	.112	.138	6
Boys			
A/C	.109	.114	6
B1	.163	.074	5
B2/B3	.216	.135	8
B4	.234	.169	6
Total	.172	.142	56

[1] ANCOVA with attachment quality and sex of child as factors, and SES as covariate ($n=56$)

According to the kindergarten teachers, anxiously attached girls indeed show less optimal ego-control. Anxiously attached boys, however, show optimal control. Dependently attached B4 boys are regarded as least optimally ego-controlled, while B4 girls, together with B2 and B3 girls, appear to be most optimally controlled. Because of missing data, only 56 children are involved in Table 1.

Attachment behaviors and resiliency/control

Because our number of subjects did not allow the inclusion of all variables in the multiple regressions, the following scales were selected: "proximity seeking and contact maintaining" (a combination of "proximity seeking" and "contact maintaining"), "avoidance", and "resistance". "Crying behavior" and "exploratory manipulation" are included as well. Lastly, sex of child and working status of the mother appeared to be the most relevant background variables. These variables were used as predictors in multiple regression analyses with backward selection. Criteria were scores on resiliency and control.

In Table 2, the results of the regression on ego-resiliency (as perceived by the parents) can be found.

Table 2
Multiple regression on ego-resiliency (as perceived by the parents) with sex of child, working status of the mother, and attachment variables as predictors[1]

	Ego-resiliency (parents)			
Predictors	β	T	p	r_p
1. Sex	-.36	-3.1	.003	-.38
2. Avoidance	-.37	-2.7	.01	-.34
3. Crying	-.42	-3.1	.003	-.38
R=.52; R^2=.28; $F(3,56)$=7.1; p=.0004				

[1] n=60; the procedure is backward selection of predictors (p=.10)

Negative attachment behaviors, such as crying and avoidance, point to less resiliency three years later. Avoidant behavior, in particular, is almost exclusively shown by anxiously attached children. Crying behavior is also shown by dependently attached (B4) children. The correlation with sex of child points to boys having less resiliency than girls. The partial correlations, indicating the strength of the relation with resiliency controlled for the other predictors, show the magnitude of the effects. These are relatively large taking into consideration the time span between measurement of attachment behaviors and of resiliency. In this way 28% of the variance was explained.

Separate regressions for boys and girls - leading, of course, to a relatively unfavorable ratio between subjects and variables - show that avoidant behavior is a good predictor of low resiliency in girls. For boys, crying behavior and working status of the mother appear to be good predictors of the same criterion. Boys, then, seem to be more context dependent than girls.

Results of regressions on ego-control are more complex. Both extremes of the variable "ego-control" are unfavorable: Neither weak nor strong ego-control seem to be a stimulating condition for solving problems and relating to peers. The optimum probably lies in the midrange. A positive score on ego-control points to weak control, a negative score indicates strong control. Apart from that, bivariate scattergrams of attachment behaviors and control did not show curvilinearity. In Table 3, the outcomes of the regression on ego-control (sorted by the parents) are described.

Table 3
Multiple regression on ego-control (as perceived by the parents) with sex of child, working status of mother and attachment variables as predictors[1]

	Ego-control (parents)			
Predictor	β	T	p	r_p
1. Exploration	-.38	-2.4	.02	-.30
2. Avoidance	.30	2.1	.04	.27
3. Resistance	-.37	-2.6	.01	-.33
R=.39; R^2=.15; $F(3,56)$=3.3; p=.03				

[1] n=60; the procedure followed is backward selection of predictors (p=.10)

From Table 3, it can be derived that avoidance in the Strange Situation predicts weak control three years later, while exploratory manipulation and resistance covary with strong control. Fifteen percent of the variance of ego-control is predicted by three variables: exploration, avoidance and resistance. These results contradict the hypothesis that resistant attachment goes with weak control and avoidant attachment with strong control (Arend et al., 1979). In the last paragraph of this chapter, this contradiction will be discussed.

The results of the regression on ego-control are most remarkable for the subgroups of girls. In Table 4, the results of the regression analysis for girls are shown.

Table 4
Multiple regression on ego-control for girls (as perceived by the parents) with working status and attachment variables as predictors[1]

	Ego-control			
Predictor	β	T	p	r_p
1. Exploration	-.44	-2.4	.02	-.40
2. Avoidance	.59	3.5	.002	.54
3. Resistance	-.59	-3.6	.001	-.55
R=.63; R^2=.39; $F(3,30)$=6.4; p=.002				

[1] n=34; backward selection of predictors (p=.10)

From Table 4, it can be derived that 39% of the variance is predicted by the above mentioned attachment behaviors: exploration, avoidance and resistance. The partial correlations are relatively high, and point in the same direction as found in the total sample. Exploration and resistance go with strong control, while avoidance is related to weak control. For boys, the regression on ego-control shows no significant effects. In this respect, girls appear to be more "predictable" than boys.

Regressions on ego-resiliency and ego-control (both as sorted by the kindergarten teachers) did not produce significant results. In the regression on optimal control (sorted by the parents), attachment variables do not play a significant role. Only background variables, like sex of child (partial correlation: r_p=.37) and working status of the mother (r_p=.28), contribute significantly to the prediction. Girls appear more optimally controlled than boys; children of full-time homemakers are more optimally controlled than children of working mothers (working 15 hours per week or more outside the home). Regressions in both subgroups - girls and boys - yielded more or less equivalent results.

In attachment theory, it is supposed that quality of attachment remains stable, provided that social context for parent and child is relatively continuous. Divorce, illness, etc., could be factors contributing to discontinuity in the child's adaptiveness to developmental tasks. Selecting the subjects (*n*=46) who did not experience such disrupting events (according to information obtained through interviews and a questionnaire), the pattern of correlations between attachment and Q sort variables does not change radically. The results show a tendency towards somewhat stronger correlations, indicating more continuity, but the changes are rather small. Because of the stable group's limited size, repeating the multivariate analyses would considerably reduce the reliability of the outcomes.

SECOND PART OF THE EMPIRICAL STUDY: ATTACHMENT AND INSTRUCTION

Procedure

As mentioned above, all subjects from the first part of this study were presented four instructional tasks and an intelligence test.

The instructional tasks

Mother-child pairs were requested to solve four tasks. The mother was asked to instruct her child (if necessary) as she and her child were accustomed to. The whole problem-solving process was videotaped. The four tasks were Duplo, Logics, Butterdish and Wiggly. In the Duplo task, the child had to build a construction using a photograph of the desired end result as a model (Duplo is Lego for young children). Logics consists of a series of five pictures, which, if laid down next to each other in the right order, form a coherent story. The Butterdish is a series of round boxes of different sizes which fit together only when turned upside down (because of the protruding bottom of each box). The task for the child is to fit the boxes together in such a way as to form one compact box (having the size of the largest box). Finally, the Wiggly block is a wooden cube which has been cut up to produce nine pieces of irregular form. The child has to reconstruct the original cube (De Zeeuw, 1971). The four tasks were presented to the child in the above mentioned order, corresponding to the supposed level of (ascending) task difficulty. Mean time for reaching the solution in the tasks was 153, 117, 139, and 447 seconds. To prevent unduly frustration in the Wiggly task, the maximum amount of problem-solving time was fixed at 10 minutes.

Observation scales

Various observation scales were developed for the analysis of the behavior during the tasks. In the Duplo, Logics and Butterdish tasks, nine observation scales were used. In general, they were 7-point scales. The mother's contribution to the emotional atmosphere was measured using 3 scales (extent of smiling and laughing of the mother; sum total of positive and negative remarks; degree of physical distance she kept). The mother's instructional or tutorial behavior was also judged through 3 scales (number of good prompts and hints; number of concrete interventions like pointing; speed of intervention, if the child was performing suboptimally). The interaction between mother and child was determined through 2 scales: frequency of total interaction and frequency of inadequate interaction. The latter scale was meant to register possible frictions between the mother and her child. The child, for instance, may ignore the mother's hints and prompting, or mother and child may be trying to solve the task independently, without paying attention to each other's efforts (this happened frequently during the difficult tasks). Finally, the child's ability was estimated on a 7-point scale. All behaviors were rated independently by two observers and the mean interobserver reliability was .83, .82, and .84 for Duplo, Logics and Butterdish respectively. Several new observation scales were developed for the Wiggly task. Retained were the 3 scales measuring the emotional climate during problem-solving. The scale measuring the number of good hints and the scale judging the degree of inadequate interactions were also retained. The remaining scales were, for various reasons, not adequate for the Wiggly task. The number of concrete interventions by the mother, for instance, was invariably high, thus making the scale for these behaviors of little value. It was therefore decided to develop 8 new scales, all measuring specific aspects of the problem-solving behavior in the Wiggly task. The first 6 scales were designed to measure the mother's tutorial behavior in this specific task. (How many times the mother explains that the part of the block under consideration is a corner piece; How many times she points out that it is a lateral side; How many times she shows that a piece of the block can be rotated along the longitudinal axis; How many times for the latitudinal axis; How frequently she explains the advantage of sorting the pile of pieces; How many times she points out the specific form of a certain piece of the Wiggly block). The other two scales were intended to register the events when a child lost interest in the task. This could happen due to frustration, fatigue or because the task was too tedious (Is the child actively participating in the problem-solving process; Is the mother trying to lure her child back into task performance). Finally, the mother's competence in this task was estimated. All scales were rated independently by two observers, and the average interobserver reliability was .85.

The Leiden Diagnostic Test

The children had to individually solve several subtests of this test for cognitive performance. The combination of the selected subtests is considered by the constructors to be an effective and reliable means of measuring independent cognitive performance (Schroots & Van Alphen de Veer, 1976). The subtests were "Block patterns", "Word span", "Pointing out pictures", "Repeating sentences", and "Comprehension". The subtest "block patterns" is intended to test the visual channel and, according to the test constructors, taps the following cognitive functions: pattern perception, matching, analysis, synthesis, reasoning, and eye-hand coordination. The subtest "word span" is aimed at the auditory channel and measures the level of the following cognitive functions: attention and immediate memory for word sequences. "Pointing out pictures" is aimed at both the auditory and the visual channel and the corresponding functions are attention, memory for word sequences, and matching. The subtest "repeating sentences" taps the auditory channel with the functions: attention and immediate memory for sentences. Finally, with the subtest "comprehension" we were able to measure the auditory channel and the functions: question comprehension, reasoning, and productive language ability. This is the smallest set of subtests covering all possible psychological functions. According to the test constructors it can also be used to compute a reliable IQ score. For details of the scoring procedure, we refer to the test manual (Schroots & Van Alphen de Veer, 1976).

RESULTS

The instructional tasks

First, we will draw attention to the instructional tasks. As a first step in the data analysis, we checked whether the observation scales were in some meaningful way interconnected. If, indeed, they would form coherent clusters, then the data could be taken together without loss of information. A first principal component analysis (varimax rotation) resulted in an unequivocal 5-factor solution. The first four factors each represented one instructional task, while the fifth factor apparently represented the general emotional atmosphere, as becomes clear from the fact that only observational scales measuring the emotional climate during the task loaded on this factor. As only the emotional climate factor was a general factor, a principal component analysis was done for each of the instructional tasks separately. For the Duplo and Logics tasks, a simple 2-factor solution emerged (see Table 5 and Table 6). The first factor clearly represents the instructional variables, while the second factor stands for the emotional climate during task performance.

Table 5
Principal components analysis for the Duplo task

Factor	1	2	Communality
Variable			
Smiling of mother[1]	-	77	60
Posture of mother	-	79	66
Number of good prompts	84	-	72
Concrete interventions	75	-	60
Frequency of interaction	79	37	76
Inadequate interactions	72	-41	69
Skill of child	-82	-	68
Eigenvalue	3.25	1.46	
% variance	46.4	20.8	

[1] See text for a description of the scales

Table 6
Principal components analysis for the Logics task

Factor	1	2	Communality
Variable			
Smiling of mother[1]	-33	74	66
Number of good prompts	85	-	78
Frequency of interaction	39	78	76
Inadequate interaction	78	-	62
Skill of child	-88	-	78
Eigenvalue	2.38	1.22	
% variance	47.5	24.4	

[1] See text for a description of the scales

It is evident from the factor loadings, however, that giving instructions to the child is not altogether favorable. It involves many frictions between mother and child, as can be seen from the loadings of the scale for inadequate interactions. The factor analysis of the Wiggly and Butterdish tasks resulted in a different picture. It is true that again the simple two factor solution is found (see Table 7). This time, however, many instructions do not involve a high level of inadequate interaction between mother and child.

The Butterdish problem, being more difficult than the Duplo task and less difficult than the Wiggly problem, occupies an intermediate position. A 3-factor solution can easily be interpreted (see Table 8).

As in the tasks mentioned above, the factor for the emotional climate (factor 2) also emerges. The third factor is the same factor as found in the Duplo and Logics tasks, representing the instruction scales - this time, however, without the loadings of the scales "concrete interventions" and "inadequate interactions". In this rather difficult task, apparently, instruction for the first time acquires an unequivocally positive character, a picture which is confirmed by the results for the even more difficult Wiggly task. Finally, the "concrete interventions" and "inadequate interactions" now load on the first factor. It seems that during this task, mother-child frictions are mainly caused by the mother's concrete interventions.

Table 7
Principal components analysis for the Wiggly task

Factor	1	2	Communality
Variable			
Skill of mother	65	-	43
Smiling/laughing of mother	-	58	36
Evaluative remarks by mother	-	63	41
Mother's posture	-	74	59
Number of good prompts	91	-	84
Mother's pointing out:			
Corner pieces	57	-	39
Lateral sides	70	-	49
Rotation along longitudinal axis	53	35	40
Rotation along latitudinal axis	56	-	37
Advantage of sorting pieces	53	-	29
Specific form of pieces	-	-	14
The child's task involvement	44	50	44
Inadequate interaction	62	51	65
Eigenvalue	4.09	1.71	
% variance	31.4	13.2	

Table 8
Principal components analysis for the Butterdish task

Factor	1	2	3	Communality
Variable				
Smiling of mother	-	78	46	82
Evaluative remarks	-76	-	-	60
Mother's posture	-	76	-	68
Number of good prompts	-38	-	70	66
Concrete interventions	77	36	-	75
Speed of intervention	-	-	79	64
Frequency of interaction	-	74	53	89
Inadequate interaction	78	-	-	65
Eigenvalue	2.73	1.85	1.10	
% variance	34.1	23.1	13.8	

It can thus be concluded that the factor structures (and the correlation matrices not shown here) of the instructional tasks are readily interpretable. The Duplo and Logics task can be grouped together. In both tasks a simple factor structure is found, indicating a positive relation between the instruction factor and the number of mother-child frictions. This seems to imply that much instruction during these relatively simple tasks is not without its drawbacks. A different picture emerges from the Butterdish and Wiggly tasks. Here inadequate interactions are not solely related to instructional behaviors.

Refraining from further interpretations at this moment (see the discussion paragraph), it can be concluded that the information of the observation scales can be condensed considerably. On these grounds it was decided to use the following combined scales in all further analyses (see Table 9).

Table 9
Combined scales used in further analyses (on the basis of factor loadings)

New scale	Old scales
General atmosphere	= summation of the scales for smiling in all four tasks
Wiggly atmosphere	= smiling + evaluative remarks + posture
Duplo instruction	= prompts + concrete interventions + frequency of interaction + inadeqate intervention
Logics instruction	= prompts + frequency of interaction + inadequate interventions
Butterdish instruction	= prompts + speed of intervention
Butterdish concrete contribution	= evaluative remarks + concrete interventions + inadequate interventions
Wiggly instruction	= skill of mother + prompts + inadequate interventions

For all tasks, it was recorded whether the mother-child dyads attained a solution, and if so, what the solution time required was.

Attachment classification and instruction

The next step in the data analysis was to establish the relationship between the newly constructed combined scales and the attachment data found in the first part of this study. The possible link between early childhood attachment and later problem-solving behavior was investigated both on the level of attachment classifications and on the level of attachment behaviors. Because the C-category consisted of only 4 children, the A and C groups were combined. Further, the normative groups B2 and B3 were also combined, resulting in four classes, viz., A+C; B1; B2+B3; and B4. The class variable was used as a factor in two-way covariance analyses, taking sex of child as the second factor and using various covariates. The various combined scales, mentioned above, served as a criterion.

The ANCOVA with emotional climate as criterion produced only one significant effect: sex ($F[1,53]=7.3$; $p=.009$). For girls, the average score on the emotional climate scale is considerably lower than for boys if age is taken as a covariate. Apparently, the emotional atmosphere during this type of instruction tasks in general cannot be predicted by attachment classifications found three years before. Another picture emerges if an ANCOVA is done, taking the atmosphere during the Wiggly task as a criterion and the LDT score as a covariate (a positive correlation between these two variables had been found). A significant main effect for class is found ($F[3,48]=3.0$; $p=.039$). During this difficult task the anxiously attached children from the A/C group apparently work in a less favorable climate as compared to the other groups. It seems that during the often frustrating conditions of the Wiggly task, mothers of these children create a less encouraging atmosphere than mothers of other children. This does not mean that anxiously attached children will automatically perform worse on the Wiggly task. It is true that an ANCOVA with sex and class as factors and solution time as dependent variable will result in a significant class effect ($F[3,56]=3.2$; $p=.028$). Inspection of the averages, however, learns that this effect is caused by the A/C group and B2/B3 group taking more time than the other two groups. It was to be expected that the anxiously attached group would need more time. Surprisingly enough, however, they are joined in this respect by the securely attached children, generally seen as forming the "optimal" or "normative" group. The ANCOVA's with the other combined scales as criteria did not result in significant effects. This means that on the level of attachment classifications, the relationship between attachment as measured at two years of age and behaviors during instructional tasks three years later is limited.

Attachment behaviors and instruction

If we carry on to the level of attachment behaviors, some relations can be found, but they do not really clarify the picture. The results are given below of a multiple regression analysis on the emotional climate scale, with attachment behaviors, age, sex, SES and IQLDT as predictors (see Table 10).

Table 10
Multiple regression on general atmosphere with attachment behaviors, age, sex, SES, and IQLDT as predictors

	General Atmosphere			
Predictor	β	T	p	r_p
IQLDT	.23	2.0	.05	.25
Avoidance	-.25	-2.1	.04	-.26
Age	.22	1.8	.08	.23
R=.42; R^2=.18; $F(3,58)$=4.15; p=.01				

From this analysis on the micro level it can be seen that the attachment behavior "avoidance" is the only predictor to appear from the regression equation. Much avoidance behavior in the Strange Situation (typical for children from the A-group) is negatively related to scores on the emotional atmosphere scale. However, as we saw before, this tendency does not manifest itself on the level of attachment classifications. The same regression on the emotional atmosphere scale during the Wiggly task did not result in significant predictions.

The multiple regressions on the instruction scales do not provide a clear picture. Significant predictions for instruction during Logics and for concrete interventions during the

Table 11
Multiple regression on instruction (Duplo) with background- and attachment variables as predictors

	Instruction (Duplo)			
Predictor	β	T	p	r_p
Avoidance	-.39	-2.6	.01	-.32
Proximity/Contact	-.27	-1.8	.08	-.23
R=.33; R^2=.11; $F(2,57)$=3.4; p=.04				

Butterdish task were not found. For the other instruction scales, significant regression equations were found. The multiple regression for instruction during Duplo is to be found in Table 11.

It appears from Table 11 that avoidance covaries with instructions during the Duplo problem. More proximity and contact seeking also seems to predict less instruction during this task. The multiple regression for instruction during the Butterdish problem is depicted in Table 12.

Table 12
Multiple regression on instruction (Butterdish) with background- and attachment variables as predictors

	Instruction (Butterdish)			
Predictor	β	T	p	r_p
IQLDT	-.22	-1.73	.09	-.22
Crying	.32	1.91	.06	.25
Proximity/Contact	-.43	-2.54	.01	-.32
R=.38; R^2=.14; $F(3,56)$=3.14; p=.03				

It is clear from Table 12 that, apart from the IQ background variable, crying, proximity and contact seeking are the attachment behaviors, which, to some extent, predict instructional variables during task performance in the Butterdish task three years later. Proximity and contact seeking are the strongest predictors and the relation is the same as found when analyzing instruction during Duplo: the more intense the proximity and contact seeking, the less instruction is given during the problem-solving process. For "crying" the relation is exactly the other way around: the more the child has been crying in the Strange Situation, the more instruction is given during the task. Finally, a regression analysis for instruction during the complex Wiggly task results in the following picture (see Table 13).

Table 13
Multiple regression on instruction (Wiggly) with background- and attachment variables as predictors

	Instruction (Wiggly)			
Predictor	β	T	p	r_p
Avoidance	.32	2.1	.04	.27
Crying	.40	2.6	.01	.34

R=.35; R^2=.12; $F(4,54)$=3.79; p=.03

It can be seen from Table 13 that crying, as with the Butterdish task, contributes to the prediction: the more the child has been crying during the Strange Situation, the more instruction it will receive during the difficult Wiggly task. The same holds, but to a somewhat lesser extent, for "avoidance": the more frequent the avoidant behavior of the child, the more instructions it will receive from its mother three years later while struggling with the most difficult Wiggly task.

It can be concluded, therefore, that on the level of attachment behaviors, instructional variables during Duplo, Butterdish, and Wiggly can be predicted to some degree. "Avoidance", "crying", and "proximity/contact seeking" are responsible for these predictions. In various regression equations "crying" and "proximity/contact seeking" are related in the same way to the criterion. More crying implies more instructions, both for the Butterdish task and for the Wiggly task. More proximity/contact seeking, however, means less instruction, both for the Duplo problem and for the Butterdish problem. The "avoidance" behavior poses some problems: more avoidance is related to less instruction during Duplo, but at the same time it is related to more instruction during the Wiggly problem. This is counterintuitive considering the fact that much instruction during the Duplo task is probably not very adequate, but highly necessary during the very difficult Wiggly task. The anxiously attached behavior "avoidance" here appears to be related to the number of adequate instructions the child receives.

DISCUSSION

Attachment and resiliency/control

The expectation that, on the level of attachment classifications, secure attachment is connected with a larger degree of resiliency and a more optimal control has only partly been confirmed. It is only for the anxiously attached girls that we find markedly less optimal control, as compared to securely attached girls (cf. Lafreniere & Sroufe, 1985). The opposite picture, however, was found for boys. The expected relation of *attachment class* with resiliency did not emerge at all. Two-year-old children, classified as anxiously attached, will not differ three years later from children otherwise classified as regards ego-resiliency. The results, therefore, show hardly any continuity in the capacities for adaptation. On the contrary, they seem to point to plasticity and flexibility in early childhood and strongly suggest a critical attitude towards sweeping statements about the long term effects of the early mother-child bond. Of course, the child is the center of a whole network of attachments. Perhaps measurement of the quality of these emotional bonds would have revealed more continuity (Van IJzendoorn, Tavecchio, Goossens, & Vergeer, 1985). For it is quite conceivable that relations with other persons than the mother may have had a compensatory effect.

Nevertheless, there is continuity on the level of *attachment behaviors*. Children showing much avoidance or crying in the Strange Situation, for instance, are bound to have less ego resiliency three years later. This finding coincides with the results found by Sroufe (1983) and by Van Lieshout et al. (1983). The latter found strong correlations between crying - especially in the playroom - and ego resiliency.

Ego-control can also be predicted on the basis of the attachment behaviors measured three years before, but to a somewhat lesser degree. In this case, the attachment behaviors "exploration", "avoidance", and "resistance" must be taken into consideration. The prediction is especially strong for the subgroup of girls. This finding is in agreement with the greater context dependency for boys found by, for instance, Rutter (1979), and confirmed by Van Lieshout et al. (1983), and Lafreniere and Sroufe (1985). One also finds in the relevant literature many results indicating a greater fragility in this age period for the strong sex (e.g., Lewis, Feiring, McGuffog & Jaskir, 1984).

It is true that the present analysis shows a peculiar pattern: resistance covaries with strong ego-control; avoidance, however, implies weak ego-control. Assuming that avoidance represents anxiously avoidant attachment and resistance points to an ambivalent resistant attachment, it can be predicted, on the basis of research done by Arend et al. (1979), that avoidance corresponds to strong ego-control and resistance corresponds to weak control. Taking into account the not very controlled behavior of C-children in the Strange Situation, as compared to the seemingly stolid and overcontrolled behavior of A-children, this seems - at first sight - quite a plausible supposition. For it is C-children who give free course to their emotions: they cry a great deal and are desperately looking for the mother during the separation episodes. A-children, on the other hand, seem to concentrate exclusively on the toys, and even seem to ignore the mother when she returns, although psychophysiological studies have shown that these children are at least as upset as the C-children (Ainsworth et al., 1978).

But appearances are deceptive here. There is a great difference in overt behavior - not in the underlying emotions - between the home situation and the laboratory situation. Ainsworth et al. (1978) indicate that A-children at home cry approximately as much as the C-children and thus seem to have the same poor ego-control. They furthermore point to differences within the A- and C-groups. C2-children, in particular, are very passive in the home situation, and A2-children seek much less the proximity of the mother when she returns than the A1-children. Although these intra-group differences have not been tested statistically (due to the small numbers of the subjects), they should make us cautious. For the intra-group differences may enter the picture when measuring ego-resiliency and ego-control which are based on behavior shown at home or in kindergarten.

Indications for a less obvious hypothesis than that of Arend et al. (1979) can also be found in Sroufe et al. (1983). They report that during activities involving larger groups and during play, it is avoidantly attached children in particular who seek social help; resistantly attached children, on the other hand, show more involvement in smaller groups, especially if the teacher initiates the interactions. The latter fact points to the children's docility, which is a typical result of strong ego-control. Also from teachers' descriptions, the C-children emerge as being somewhat reserved, while avoidantly attached children come to the fore if the stress does not exceed a certain level. A-children tend to withdraw to some quiet corner of the playground or classroom, when hurt or disappointed (Sroufe et al., 1983). Such behavior seems to coincide exactly with behavior typical for weak ego-control. One of the items used to measure the degree of ego-control is, for example, "reacts disproportionally to slight frustrations".

From our qualitative study, in which 8 children were being observed in the classroom for half a year, the C-children indeed emerge as strongly controlled, unconspicuous toddlers, whereas A-children show little control. Although the data have not been analyzed to a sufficient degree, a first reading of the observers' reports strongly suggest that the C-children are rather reticent. The observers report having trouble in making out these children, due to their apparent reluctance to express their feelings. C-children are on good terms with their classmates and are rarely involved in quarrels with other children. They tend to show little spontaneity in their contacts, however, and do not take the initiative, tending to join the others in their activities. The description of A children tends towards the opposite direction, which is of some significance, as the observers were unaware of the hypothesis put forward here. The anxiously avoidant children belong to the clearly "visible" part of the group. They are likely to have problems with their classmates, for instance, when interesting materials are being handed out. A-children are not well prepared to share "their" materials and may react aggressively in such a situation.

Against the background of these descriptions of passive compliant C-children and dominant, but quickly frustrated A-children, our findings gain credibility. It is quite conceivable that the A and C-children's behaviors inside and outside the laboratory are each other's mirror images, while still having the same underlying structure of anxious attachment. For both groups this underlying structure results in less adequate adaptation as compared to securely attached children.

Lafreniere and Sroufe (1985) formulated a hypothesis which may hold for A-children. They suggest that these children develop resistant and aggressive behaviors as the result of their having a resistant and emotionally inaccessible mother. C-children, on the other hand, may have become convinced that even conspicuous attachment behaviors like crying, etc., do not help in making their source of security more accessible. They may also follow the example of their rather passive (Belsky, Rovine, & Taylor, 1984) caregivers, and exchange their vain attempts to attract attention for a passive and reserved role.

Attachment and instruction

The results of the second part of this follow-up study indicate the following mother-child interaction pattern during instructional tasks. The mother will create a certain atmosphere, no matter what the task and no matter what the instructions. Some mothers are very encouraging and empathetic during all joint problem-solving, others show a more neutral or negative attitude. This general atmosphere characterizes the mother-child relation during the situation created by the investigators. The main question was whether this general atmosphere can be predicted by the quality of the mother-child attachment relation as measured three years earlier. The question had to be answered in the negative, and, in fact, sex of the child turned out to be the best predictor. On average, the atmosphere between mother and child is worse for girls. Such a result will not surprise, of course, the followers of the Viennese magician, but to the nonbeliever it poses a serious problem.

It was possible, however, to predict the atmosphere on the basis of the attachment behaviors. A multiple regression analysis shows that in particular "avoidance", typical for A-children, plays a role here. A clearer picture emerges if we concentrate exclusively on the difficult Wiggly task. It is found that anxiously attached children have to solve the problems in a less benevolent atmosphere. During the Wiggly task, mother and child face quite difficult problems (as shown by the fact that only 59% of the mother-child pairs found the solution), which has a negative effect on the anxiously attached group. It seems that under these stressfull circumstances, the mother-child interplay has still not reached the optimal level.

Shifting our attention to the other instruction tasks, supposedly very important for the child's cognitive development, we find the following picture. Much instruction involves a great deal of mother-child friction during the relatively simple Duplo and Logics problem. This ceases to be the case when mother and child are solving the difficult Butterdish and

Wiggly problems. Instructions are well received there. We submit that the giving of many instructions during the relatively simple tasks is simply a suboptimal procedure, the child being quite competent in these tasks on its own. A lot of instruction then implies a severe limitation of the child's freedom in acting, which certainly does not enhance his or her problem-solving abilities. In other words: the tasks are situated entirely within the zone of actual development of the child, and thus there is no need for the mother to create a zone of proximal development by means of instruction. Not so for the Butterdish problem, and especially the Wiggly problem. For these unknown and difficult tasks, the child has not yet developed a feeling of competence, the less so as for nearly all children the task is beyond their zone of actual development. The child, then, is dependent on sensitive tutorial assistance for successful problem-solving to be possible. It is hardly surprising that instructions meet with less resistance here. The mother's instructions are instrumental for task completion and therefore do not involve an enhanced number of inadequate interactions.

It is found that instructional behavior cannot be predicted by attachment classifications, neither for difficult problems, nor for simple problems. The multiple regression analyses on the basis of attachment behaviors do not yield an unequivocal picture. For instance, avoidance - an important indicator of anxious attachment - involves more instruction during the complex Wiggly task, but less instruction during the rather simple Duplo task. Mothers of securely attached children, then, definitely do not give better instructions than mothers of anxiously attached children. This points to the fact that sensitivity towards cognitive abilities and potentials is clearly different from sensitivity in the affective-emotional field. This was also borne out by the factorial structure for the various instructional tasks. The relation between affective-emotional development and cognitive development, therefore, cannot be explained in a straightforward way by referring to a single, general sensitivity of the mother. The cognitive interplay between mother and child cannot be predicted on the basis of the affective dialogue measured three years before. Relating mother-child performance to needed problem-solving time, does not improve things. Attachment class emerges as a significant predictor only for the Wiggly task, which was due (as mentioned above) to the fact that both the anxiously attached group and the securely attached group were slow in solving the problem as compared to the B1- and B4-groups. Quite unexpectedly the anxiously attached children were not inferior to the normative B2/B3-group.

CONCLUSIONS

Two aspects of the continuity hypothesis were investigated in this study: in the first part we looked at the child's internal representations or "personality"; in the second part we focused on the mother-child interactions (the pedagogical context).

If ego-resiliency and ego-control can be considered to be building blocks of the child's personality - reflecting its way of dealing with difficult social and nonsocial problems - then the results of the first part of this study show that attachment behaviors are of considerable value in predicting personality development. Negative attachment behaviors, such as crying and avoidance, point to less resiliency three years later. Children who showed much resistant behavior and exploratory manipulation in the Strange Situation show strong control; children demonstrating much avoidant behavior show less control three lears later. One suspects, of course, that the caregiver's behavior and personality play a role here. Resistant and avoidant children may imitate their caregivers, for instance. Nevertheless, irrespective of this contextual factor, the degree of continuity is quite large. Attachment quality indeed seems to crystallize into a relatively stable personality trait as regards ego-resiliency and ego-control.

In the second part of this study, aimed at mapping out the relation between attachment and instruction, an attempt was made to account for the quality of the pedagogical context. The way the mother creates the atmosphere during the problem-solving process was established. Further, we registered her tutorial interventions. These appeared not to be systematically related to attachment as measured three years earlier. Instructions turned out to be independent of the emotional atmosphere during problem-solving. It appeared that cognitive instruction and social-emotional context form two orthogonal dimensions. We have no grounds, therefore, to assume some sort of general sensitivity for both the affective and the cognitive domain. Neither is it obvious, taking into account the independence of emotional atmosphere and cognitive instruction, to assume a relation between attachment and instruction. This does not exclude, however, continuity in the affective domain. Indeed, we found some continuity between attachment and atmosphere during the most difficult, and therefore most frustrating Wiggly task. Much avoidant behavior in the Strange Situation will predict a negative atmosphere here. Anxious attachment in general was related to a negative atmosphere. On the other hand, caregivers who show sufficient responsiveness in the Strange Situation to develop a secure attachment relation with their child are found to instruct their children in a better atmosphere. In this sense they are more responsive than parents of anxiously attached children. The cognitive level of their instructions, however, is not necessarily higher.

We conclude, therefore, that both hypotheses on continuity were to a certain extent confirmed by our experimental findings. Attachment appears one of the factors determining the child's personality, probably because it leads to relatively stable internal representations of the self, the caregiver, and the relation between the self and the caregiver. Furthermore the relation between attachment and atmosphere seems to point to the caregiver's responsiveness being relatively constant, at least for the cognitive domain. This may mean that continuity in early childhood development is determined by two factors: first, the crystallization of internal representations as regards the ability of solving social and nonsocial problems; second, the caregiver's stability in affective responsiveness.

Note:

1. In writing this chapter we made use of the following articles:
   - Van IJzendoorn, M.H., & Van Vliet-Visser, S. (1986). Gehechtheid, ego-veerkracht en ego-controle. Een longitudinale studie [Attachment, ego-resiliency and ego-control. A longitudinal study]. *Kind & Adolescent*, 7, 77-90.
   - Van der Veer, R., Van IJzendoorn, M.H., & Van Vliet-Visser, S. (1986). Gehechtheid en cognitie. Een longitudinaal onderzoek naar de relaties tussen affectieve en cognitieve ontwikkeling in de voorschoolse periode [Attachment and cognition. Exploratory research on the relationship between emotional and cognitive development in preschool]. *Pedagogisch Tijdschrift, 11*, 289-298.

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Part Three

EXTENSION INSIDE THE FAMILY: A SMALL-SCALE APPROACH

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ATTACHMENT IN SOCIAL NETWORKS
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CHAPTER 6

ATTACHMENT INSIDE THE FAMILY[1]

Kurt Kreppner

ABSTRACT

Recent results in attachment research point to a number of unresolved interpretation problems which may be associated with restrictions inherent in the classical attachment paradigm. This paradigm presumes a unique relationship between the infant and a primary caregiver. In order to overcome these shortcomings, the family as a whole, with its multiple relationship network, is taken as a new basis for interpretation.

Results from a longitudinal study are presented and reviewed, focusing on the extent to which they can contribute to a reformulation of the actual attachment framework.

INTRODUCTION

Psychology as a science of early development began its empirical existence with the observation of individual children, as in the works of Preyer (1882), Scupin and Scupin (1907), William Stern (1927), Charlotte Buehler (1927), and Jean Piaget (1937). After Sigmund Freud (1905) had conceptualized his phase model for the child's emotional development, experiences in infancy were largely recognized as being relevant for further social development. From today's perspective, this research was very much confined to the description of the individual child's development, an almost monadic kind of conception, that basically excluded all contextual influences. Nearly half a century passed until at least parts of the context and the child's early relationships were taken into account. Rene Spitz's (1957) studies of mother-deprived child-

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ren, and Bowlby's (1969) theoretical thinking about the phenomenon of separation in infancy layed the groundwork for what today is popularly known as the notion of "attachment theory". Attachment is defined as "... the affectional bond or tie that an infant forms between himself and his mother figure" (Ainsworth, Blehar, Waters & Wall, 1978, p.303).

Interestingly enough, Hinde (1983) points to the fact that Bowlby and Ainsworth regarded attachment as exclusively directed towards one particular caregiver. This monotropic view has since strongly influenced theorizing about attachment, although it did not totally exclude the importance of other individuals such as fathers and grandparents, or even strangers. Bowlby's thinking can be interpreted as an attempt to combine biological, ethological, and psychoanalytical aspects of human development in the light of its survival function for the species. The progress of this view as compared to earlier concepts is to be seen in the fact that a *relationship*, the bonding of the infant to its primary caregivers, is taken as an essential condition for further development. This shift in thinking brought about the abandonment of a monadic concept of the child, and the opening up of infant studies for context influences. From a biological and functional point of view, the infant-caregiver *relationship* was conceptualized as being a prerequisite for survival.

Context has been stressed as being important for the developing child by such researchers as Buehler (1927), Muchow and Muchow (1935) and, of course, Lewin (1927). But the role of the emotional relationship as being essential for infant development was first elaborated by Spitz and Bowlby. Ethological methodology and a cross-cultural approach in describing early infancy in its natural context finally provided the framework for what may prove to be the empirical foundation of attachment research: Mary Ainsworth's study on early infancy in Uganda (1967), as well as in Baltimore homes (1978). The classification of differences in the quality of mother-child bonding layed the foundation for an experimental procedure which seems to have guided a multitude of studies having an essential impact on our understanding of early infancy in general. The attachment laboratory setting, with 8 episodes - introduction (1), common play mother-child (2), entrance of stranger (3), first separation from mother (4), first reunion with mother, stranger leaving the room (5), second separation from mother, child alone (6), second entrance of stranger (7), second reunion with mother (8) -led to the classification of 3 types of behavior (with subclassifications in each type) shown by children during this experimental procedure: children who ignore or avoid their caregivers' advancements in the reunion episodes (A1 and A2 children), children who greet their caregivers, move toward them and resume the exploration of their context (B1-4 children), and finally "resistant" children (C1 and C2 children), whose inconsistent behavior is to cling to their caregivers and simultaneously push them away during reunion episodes. Important experimental work on child-caregiver separation during infancy (and its consequences for early development) came from ethology, where mother-child pairs of rhesus monkeys were used for exploring the consequences of permanent mother-separation in early infancy (Harlow & Harlow, 1969; Hinde, 1983). These studies stressed the impact of the early mother-child relationship on the child's further development. When these results from animal studies were transferred to the domain of human development, mother-child bonding became an issue of major importance. The influence of secure or insecure attachment on the infant's later social and emotional development was stressed in many detailed and elaborate longitudinal studies after Ainsworth's initial research (Grossman, Grossmann, Huber, & Wartner, 1981; Lamb, 1978; Sroufe & Waters, 1977). Securely attached children seemed to succeed in their future social life, whereas insecurely attached children were most likely to run into difficulties in dealing with peers and teachers in preschool arrangements (Sroufe, 1983). It should be stressed that research on attachment widened the view on human development considerably. However, after new insights have been gained about the regularities and types of emotional bonding to a primary caregiver, the question should now be raised of how attachment mechanisms operate in real life with more than only one caregiver present.

Generally speaking, a child is born into a family with two parents, perhaps with other children. Although the mother undoubtedly plays a prominent role in the infant's life during the first months, the infant is likely to establish bonds not only with the mother but also with all other members of the family. In addition, the newborn child's arrival and growth within the family has an impact on the already existing relationships between the other family members. Up to now, however, the study of the interplay between individual development and changes of polyadic relationships inside a family after the arrival of a new child has been initiated neither by attachment research nor by other domains of developmental psychology. Family research as it is being conducted both in sociology and social psychology lacks an explicit developmental focus, although this focus could be of crucial importance in finding links between the genesis of pathological family relationships and pathological behavior in children (Bateson, Jackson, Haley, & Weakland, 1956; Haley, 1959; Vogel & Bell, 1960).

In the following sections we shall discuss some considerations that might support the formulation of a broader concept of attachment. This concept will not limit itself to a single person such as the mother or the father as the relevant caregiver, but will include the entire family with its network of multiple relationships as the relevant attachment unit to which the child is bound. The discussion consists of two parts. The first part comprises three sections, the first of which focuses on some unexplained results of attachment research. The second introduces results in infancy research endorsing a broader conception of the infant's social skills, and the third reviews some aspects of the family research area which might be of interest for attachment theory. In the second part, results will be presented from a study in which families have been observed during the first two years after the birth of a second child. These results serve to illuminate some general trends in these families' efforts to integrate a new member, and to adapt to his or her development.

PROBLEMS OF INTERPRETATION IN ATTACHMENT THEORY USING A BASICALLY DYADIC CONCEPT

Controversies about the current status of attachment theory have stirred the field considerably (Lamb, Thompson, Gardner, Charnov, & Estes, 1984). Looking at the multitude of empirical studies and results that have been produced during the last decade, the student of attachment theory is often pressed to find a proper set of pigeon holes into which the divergent data can be classified without giving up the general unifying frame of reference. Many efforts have been made to refine sampling techniques, matching methods, and statistical designs for investigating complex relationships between on the one hand different types of attachment (A1, A2, B1-4, C1, C2) and different types of caregivers (mothers, fathers, strangers), and on the other hand the long-lasting effects on the social and cognitive development of the child. The basic experimental procedure for testing the specific type of attachment behavior of the child, however, has remained practically unchanged during the years. Although attachment behavior is now one of the best studied phenomena in early human development, interpretation problems still disquiet the community of researchers, and much work remains to be done before an integration of all incoming data from longitudinal and cross-cultural research can be accomplished. From various problem areas, we have selected three major items which are of specific interest in these efforts at integration and, in addition, might point out the need for a more extended concept for the context of attachment: 1) the unrelatedness of attachment relationships to the mother and the father; 2) difficulties in predicting attachment behavior from one point to another during the second year for A and C children; and 3) the problems in finding consistent precursors of attachment types in early mother-child interaction or follow-up estimates of insecurely or securely attached children of preschool age.

These items prompt the question whether the extant theoretical framework emphasizing the quality of a dyadic relationship in early infancy is still a sufficient explanatory device for interpreting the multitude of divergent results from various studies.

Differences between mothers and fathers in attachment research

Although it has been difficult to isolate particular precursors of maternal behavior with respect to differently classified children, the overall trend seems to confirm that mothers who live in well-established environments, who have social support and are sensitive towards their children's needs will have securely attached infants. With attachment research also devoting attention to fathers in recent years (Lamb, 1977; Main & Weston, 1981; Grossmann et al., 1981), results point to the fact that children often display differing qualities of attachment to each parent. Until now, no consistent pattern has been found that could explain these differences. Inge Bretherton (1985) asks in a recent article while summarizing attachment research:

> *"How can we reconcile repeated reports that a child's history of attachment to the mother matters for later relationships with findings that quality of attachment to mother and to father is not generally concordant? To put it differently, what happens to the internal model of the self when a child feels secure in the relationship with one parent and not with the other?"* (p.29).

Emphasizing these puzzling differences, Main, Kaplan and Cassidy (1985) found in a longitudinal study that the quality of attachment to the mother in children aged two had an overriding effect in predicting results in a separation interview for the same children at the age of six, as well as in an experiment in which their reaction was tested to a photograph of their own family. No such influence was found when the quality of attachment to the father was studied. However, attachment to the father did relate to the overall functioning of the child at preschool age. What the differences signify from a developmental point of view remains unclear, and a second problem of how they come to be established in early childhood has not yet been investigated. Observing that the mother is more important than the father in one aspect, and that both parents are equally important in another does not contribute to a clarification of a basic problem that may lie behind these controversial results: How different bonding may occur inside the same proximal ecology, and how the child gains a kind of differential relational position within it. By introducing a hierarchical model, with primary and secondary caregivers, we run the risk of solidifying the basically dyadic interpretations, thus impeding other, perhaps more promising views. For example, Belsky (1981) has demanded that the quality of the marital relationship should be included when considering the infant's social and emotional development. And in an empirical study, Goldberg and Easterbrooks (1984) obtained results indicating that a good marital relationship and parental involvement with caregiving foster secure attachment. The approach of this study signals a shift from studying only dyadic patterns to looking at more complex interactions as well, which might - perhaps more indirectly - exert influence on the development of attachment qualities.

Inconsistencies in classifications of attachment types

The next aspect that has been selected focuses on the lack of stability that was found when classifying the quality of attachment at two different times during the first two years. In a longitudinal study, Thompson and Lamb (1984) found that continuity in attachment behavior for children who have been classified as A, B, or C is not greater than 50-60 percent. Contrary to results from another study conducted by Vaughn, Egeland, Sroufe, and Waters (1979), in this investigation changes in the quality of attachment were found not only from securely to insecurely attached children - which could be interpreted as coinciding with worsening conditions in the ecological or familial settings - but also in the reverse direction, that is, insecurely attached children changed to securely attached ones. Here a genuinely developmental aspect may play a relevant role.

The basically non-developmental and perhaps restrictive perspective of dyadic relationships seemingly tends to neglect the total spectrum of the child's social reality. Lamb et al. (1984) as well as Ford and Thompson (1986) point to the many futile attempts to replicate results reported by Ainsworth, Bell, and Stayton (1974), where a systematic difference had been found between A and C children: Mothers of A children were delineated as being consistently insensitive to the needs of their offspring, whereas mothers of C children appeared to be sensitive in an inconsistent way. No problems were associated with the classification of B children, whose mothers were described as being sensitive and supporting persons. Differentiation between preceding or succeeding conditions of A and C children, however, has proved to be nearly impossible since studies have produced results which cannot be interpreted within the limits of the existing theoretical framework. Studies conducted by Van IJzendoorn and Van Vliet-Visser (1985), and Erickson, Sroufe, and Egeland (1985) have dealt with this kind of differentiation more thoroughly. Their results suggest that far more complex relationships have to be unravelled before a systematic difference between the two classes of children (A and C) can be established. In a longitudinal study, Van IJzendoorn and Van Vliet-Visser (1985) revealed associations between children classified as A and C during their second year, and their control and social behavior in the preschool years. Avoidant (A) children showed a low degree of control, whereas resistant (C) children were characterized by a high degree of control. This outcome contrasts with results reported by Sroufe (1979). Resistant children were reticent in the preschool years, and showed nearly no emotional expression; they were, however, capable of establishing at least superficial contacts with their peers. Thus, they appeared to be quite well adapted to their situation. A contrasting picture was obtained when assessing their A children: they behaved conspicuously, were aggressive toward peers and unable to share toys or play materials. These results support the thesis that A children prefer to switch to an object-exploring behavior in separation situations, for they have learned that their caregivers tend to be consistently refusing. Taking later behavior as a basis for classification, Erickson, Sroufe, and Egeland (1985) found some systematic relationships between types of attachment, maternal and ecological influences, and the children's social behavior, whereas no such linkage was found regarding maternal precursors and types of attachment in the A and C classes. Anxiously attached children, who exhibited no problems in the preschool setting, had mothers who were emotionally sensitive and supportive. These mothers were supported by their families and friends. Thus, they showed the same characteristics as mothers of B children without preschool problems. B children who did have trouble in the preschool setting had mothers who were less supportive and effective in coping with frustrating situations. At 30 months, these children also lacked age-appropriate play materials in their homes.

An important result of this study is the exposure of differences in the quality of the relationships children seem to experience during their development. The interpretation clearly focuses on the differences of maternal behavior towards their children. However, for a better illucidation of the complex relationship between attachment and outcome in the preschool setting, and of the adaptation process of the child to his or her family and vice versa, far more information about continuities and changes in the whole family context is needed.

Problems in finding antecedent interaction rules for securely attached children

One last example will highlight the problems that attachment theory has encountered when clinging to a dyadic or individual orientation. Beyond the well-known result that prosocial mothers are most likely to have securely attached children, little is known about specific interaction patterns between mothers and their children, that is, what kind of mother's and infant's efforts lead to mutually satisfying interactions (Lamb & Thompson, 1986). Main, Kaplan, and Cassidy (1985), in a recent study, report great difficulties in finding "rules" that could uniquely characterize the speech of securely attached children with their mothers. They wrote:

> *"An interesting theme that runs throughout our study, is that of differences in the presence of 'rules' appearing to guide behavior in secure versus insecure dyads and individuals. In studies of speech transcripts made during reunion episodes, we noted strikingly stylized terms of speech within the insecure dyads and even within each subclass among the moderately secure dyads (i.e., B1, B2, and B4 dyads). Of all dyads studied in speech transcripts, the very secure dyads were the most difficult to identify through particular rules or stylistic terms of speech ... In sum, the very secure dyads were the dyads most free of predictable 'rule-like' regularities and patternings in discourse"* (p.101).

This interpretation of the results refers to Bowlby's "internal working model" (which will be discussed in more detail in the next section), and to "ongoing interaction patterns" between mother and child. Such an interpretation might lead the reader back to focus upon the child's personality (internal working model) or upon the mother's flexibility, but not upon what may be relevant interaction patterns that bring about specific patterns of attachment. Although the authors point to a phenomenon which may be very interesting for understanding longer lasting effects, they fail to offer an interpretation concerning the contextual specificity. If only two persons are observed, possible contextual rules which govern dyadic interaction are difficult to detect. The finding that "no rules" for verbal interaction exist in the group of securely attached children remains, in the absence of the contextual focus, a somewhat paradoxical result.

In summary, certain results from various areas of attachment research are difficult to interpret within the framework of a dyadic attachment conception. Problems in explaining differences between attachment to the father and the mother, inconsistencies in the classification of A and C children and the finding of rules characterizing communication styles of securely attached B3 children are a challenge to the dyad-oriented view dominating the framework of attachment theory. In the next section, further results will be discussed that might promote our understanding of attachment phenomena, and a polyadic view on those phenomena will be presented.

RESULTS OF INFANCY RESEARCH CONTRIBUTING TO A POLYADIC VIEW ON HUMAN ATTACHMENT

In a recent article, Ford and Thompson (1985) attempted to link concepts and research results pertaining to personal agency beliefs to concepts and results in the domain of infant attachment. According to the authors:

> *"Personal agency beliefs serve a behavioral regulation function ... they provide information which is useful in deciding whether to activate or inhibit goal-directed behavior"* (p.379).

The early development of personal agency beliefs has gained considerable attention in recent research (Lamb, 1981; Suomi, 1981). Firstly, the infant's motivation to explore and learn from the environment appears to be linked to perceptions of personal agency beliefs; secondly, the social interaction that infants establish with their caregivers may be influenced by the baby's perceived competence. Thus, this kind of approach strongly follows Bowlby's initial concept of the "internal working model" as a kind of tool that enables children to form expectations not only about their social ecology - particularly their primary caregivers' behavior - but also about the self. The combination of this personal agency beliefs approach with Bowlby's internal working model is likely to open up new perspectives in the field of attachment research. It extends beyond the basic dyadic interaction concept, although at first glance it may appear to direct the attention back to the developing self of the individual child and his or her inner representation system.

Main, Kaplan, and Cassidy (1985) have presented a concept for an internal working model which not only widens the basically biological model of Bowlby (by proposing a cognitive information processing device that takes into account social and emotional components of interaction), but also expands the model such that it has a history of its own. Thus, expectations about the partner are built up during development, and rules about how to interact with certain partners are formed. At first glance, this kind of modelling might seem to be a bit too sophisticated for explaining the actions of one-year olds, but more recent results in infancy research have shown that during the first year of life the child becomes capable of differentiating among social relationships, and of adapting his or her behavior according to expectations in interactions. In addition, the child is able to refine his or her internal working model by observation, that is, without directly interacting with the partner. Thus, merely watching a potential interaction partner may contribute to the forming of a model for handling relationships. In addition, even "efforts to gain the caregiver in the caregiver's absence" (Main, Kaplan, & Cassidy, p.77) foster the specific representations that the child generates during his or her development. All in all, the revised internal working model as it has been proposed by Main, Kaplan, and Cassidy, may, in the long run, contribute substantially to the generation of new guide-lines for studying antecedents of attachment behavior.

The following results from infancy research touch upon various matters supporting an attachment concept based on polyadic rather than dyadic mother-child or father-child relationships. Actual infancy research has enriched our knowledge about the infant's growing abilities during the first years with respect to the following matters:

1. Early in life the infant begins to learn. The kind of learning is described as being a type of contingency learning, that is, things, situations, or persons that appear together are soon associated with one another and expectancies about their appearance are formed. The beginning of contingency learning has been established after the third month, in any case during the second quarter of the first year (Finkelstein & Ramey, 1977; Watson, 1972,1979; Watson & Ramey, 1972).

2. In a series of observational mother-child studies, the development of subtly differentiated social perceptions has been observed at about eight to nine months when babies start to communicate with their partners in a more sophis-

ticated way. For example, they begin to tease their mothers by throwing blocks from the table and no longer focus on the blocks but on the mother's face to find out her reaction (described by Trevarthen & Hubley, 1978, as "secondary intersubjectivity").

3. Studies of mother-child interaction in more complex social situations, with father or sibling present, yielded results that point to the existence of secondary effects in mother-child interactions (Clarke-Stewart, 1978,1980; Dunn & Munn, 1985; Pedersen, 1980). These effects not only highlight the other family members' influence on the mother's behavior toward the infant, but also suggest the differentiation of the infant's social experience. Clearly, the infant's construction of social reality is not confined to experiences in dyadic relationships (Belsky, 1981; Brazelton, Yogman, Als, & Tronick, 1979; Bronfenbrenner & Crouter, 1983; Kaye, 1982). In regard to Bowlby's idea of the existence of an internal working model even in the very young child, it seems very likely that the baby, during the second half of the first year and during the second year, becomes able to perceive and to process more and more complex social relationships.

4. Fathers have been described as equal caretakers for children (Belsky, 1979; Parke & O'Leary, 1976), although they show some specific features when compared to mothers, such as preferring physical activity when playing (Clarke-Stewart, 1980; Lamb, 1977), or a kind of 'staccato interaction' (Yogman et al., 1977). Although caretaking activities are more the domain of mothers (Kotelchuck, 1976), fathers are competent caretakers too (Parke, 1979). However, typical roles may change if both parents are working (Pedersen, Cain, Zaslow, & Anderson 1982). Clearly, fathers are important attachment figures for children, and, quite obviously, interact differently with the infant when compared to mothers.

5. The role of siblings for the development in early childhood, particularly for social development, has not been a prominent topic in the field of attachment theory so far. However, studies conducted by many researchers show considerable impact of sibling interaction on the individual child's development such as imitating behavior (Abramovitch, Corter, & Lando, 1979; Abramovitch, Pepler, & Corter, 1982), interactional learning during the first years (Lamb, 1978), or at preschool age (Cicirelli, 1975, 1978). Judy Dunn and her co-workers (Dunn & Kendrick, 1980, 1981, 1982; Dunn, 1983) found that the arrival of a second child in a family means a change in existing relationships be-

tween mother and the first child. In addition, the establishment of a new relationship between the first and the second child is strongly influenced by the mother's behavior towards the two children.

6. Comparing the infant's activities in laboratory and home situations, Power and Parke (1982) found many differences in the frequencies in certain parent-child interaction patterns, the children's locomotor or explorative behavior, and parent behavior concerning the management of the situation. The authors warn against drawing misleading conclusions from laboratory studies about infant behavior in general. Comparing more stressful situations with less stressful laboratory situations, Lamb (1976) found differences in preferring one parent to another. Without stress, no preference of one parent over the other could be noticed. Under stress, however, infants preferred the mother when both parents were present. If only one parent was present in the laboratory, no differences even in stressful situations were found. The question may be raised whether results from many studies that indicate an overriding influence of the mother over the father might perhaps be caused, at least in part, by the very specific and unusual laboratory situation for both parents and infants.

7. Between the 12th and the 18th month, very salient changes in the infant's social development occur, and considerable increases in almost all other competencies are evident. Astonishingly, attachment theorists, albeit developmentalists themselves, seem to almost completely neglect these developmental aspects when they are interpreting results from empirical studies. Results that have been obtained with 12 months old infants are often compared with those found with 18 or 24 months old children. Even in longitudinal studies, differences in attachment classifications or preferences of one parent over the other were mostly interpreted in terms of inconsistencies, difficulties in categorization or changes in ecological conditions. Not until very recently did Campos, Barrett, Lamb, Goldsmith, and Stanberg (1983) raise the question whether inconsistencies concerning the preferences of infants at 8 and 24 months (no preferences) compared to those of children at ages 10, 13, and 16 months (preferring mother to father) can be attributed to the use of unusual samples or to the existence of a short period of time where the mother is more relevant than the father. Finally, Thompson and Lamb (1986) demand, as a prerequisite for further research in the attachment area, the inclusion of both contextual and developmental aspects.

Summarizing this section and drawing conclusions for new approaches in attachment research, one should also point to the apparent hesitation of many researchers to include findings from other areas of infant development and to take into account more explicitly the complex social situations the infant usually is confronted with in his or her environment. A widened perspective on attachment phenomena would focus preferably on two aspects: first, on developmental aspects that may play a prominent role in the construction during the first two years of social relationships and second, on contextual aspects (such as family settings with mother, father, and perhaps a sibling present) to provide a better assessment of the infant's basic social context, including the possible influence of secondary effects.

In the next section, some theoretical considerations from the field of family research will be discussed in more detail. We shall briefly describe the framework that has been constructed for the description of whole families and their problem-solving strategies. An attempt will be made to transfer some aspects of family problem-solving strategies from the area of family studies to the realm of attachment research.

A FRAMEWORK FOR A FAMILY APPROACH IN ATTACHMENT STUDIES

The family as a whole has been assessed as being a very powerful agent and perhaps an "imprinting" one, at least at the beginning of a child's life, an agent that generates specific modes for emotional and cognitive communication through which the child experiences his or her first model of "social reality" (Hill & Mattessich, 1979; Hill, 1981; Belsky, 1981). Despite the obvious difficulties in establishing a proper model for family socialization, there has been considerable consensus about the fact that the study of attachment should take into account all the complexities involved in attempting to describe an entire family system. However, in developmental psychology in general and in attachment research in particular, there has been an apparent lack of models depicting the handling of complex interaction patterns of whole *families during* the course of the child's development.

Dimensions for describing complex family systems

Drawing on a general systems approach, family theory has offered a rather elaborated framework for the description of various types of family interaction styles. Formal aspects such as structure and dynamics as well as more content-related items such as problem solving stragegies or family themes are used for providing a set of tools for the analysis of family interaction and development (Hess & Handel, 1959; Kantor & Lehr, 1975; Olson & McCubbin, 1983; Reiss, 1981).

Although created by different authors and linked to various theoretical backgrounds, the following dimensions can elucidate the spectrum of aspects considered relevant when looking at families as systems with interacting members: *Connectedness-separatedness* (Hess & Handel) depicts the degree of internal closeness among family members as they are communicating with each other and exchanging information and feelings; dimensions of *access* (space, time, energy), and dimensions of *target* (affect, power, and meaning) characterize the way family members share the same sources of their common life space, and manage to attain acceptance and satisfaction of their cognitive and emotional needs (Kantor & Lehr); *configuration* is the family members' way of perceiving and interpreting problems; *coordination* describes the family members' efforts to solve problems by common or isolated actions; and *closure* depicts the degree of embedding modes of problem-solving in family history as either being continuous or discontinuous (Reiss). Finally, a very elaborate two-dimensional circumplex model describes the family's modalities of both internal organization and adaptation to demands coming from outside. One dimension, *adaptability*, is characterized by such items as chaotic, flexible, structured, rigid; the other dimension, *cohesion*, is depicted by such adjectives as disengaged, separated, connected, enmeshed (Olson & McCubbin).

When trying to transfer some of the descriptive devices of family research to another field, two caveats should be considered very carefully: First, in nearly all cases, families that have been studied empirically had children older than those studied in attachment research (between 4 and 18 or 20 years). Second, they were studied for only a short period of time, that is, developmental changes of the children did not play an eminent role.

Thus, drawing upon these dimensions for describing family interaction can only be regarded as a first step on the road which, I hope, will lead to a more comprehensive and properly tailored device for describing entire young families in their efforts to socialize their children and, at the same time, to adapt to their infants' changing needs and abilities. So far, however, no such specified dimensions exist, and perhaps some aspects of family interaction as delineated by today's family research may help us to find out some general characteristics of polyadic interactions in early childhood.

Family tasks

Linked to the problem-solving approach to describing families is the concept of task accomplishment for characterizing varying stages of family development (Aldous, 1978; Duvall, 1977; Rodgers, 1973). A number of tasks have been isolated by various authors as being functional for family interaction, such as physical maintenance, socialization of family members for roles in the family, maintenance of members' motivation to perform roles, maintenance of social control within the family, and the addition of family members through reproduction or adoption. Aside from these fundamental and continuous obligations, other sorts of tasks exist which are to be accomplished at particular stages in the family's life span, for example, the establishment of the family, taking care of small children, or dealing with schoolchildren or adolescents. Just as there is a set of developmental tasks that the individual living organism must achieve in the course of its development, a set of family tasks is suggested which must be achieved during the course of the family's development. As an expanding system, the family necessarily has to adapt to the varying needs of the developing child and also to reconcile the differing and changing interests of all members in the expanding system. Such adjustments might trigger new forces of interaction within the family system that may not only induce the family members to integrate the new member, but may also promote new patterns of interaction and problem-solving that, in turn, foster "development" of the family as an interacting system.

The concept of family development presumes that there is a similar set of tasks that every family has to accomplish during its life course. In this perspective families can be compared to one another in specific stages of their career according to their accomplishment of certain tasks (Rodgers, 1973; Aldous, 1978; Olson & McCubbin, 1983).

Adapting Bowlby's internal working model to the framework of a polyadic perspective

Family dimensions and family tasks can serve as useful tools for establishing a new look at the infant's efforts to cope with his or her complex social reality and emotional bonding within a family. Attachment theory has not yet succeeded in establishing elaborate relationships with the field of family theory, and therefore many interpretations of attachment phenomena, although in some cases pointing to rather complex patterns of attachment within a family, have remained basically individual-oriented.

The extended concept of an internal working model in the child as depicted in a somewhat more cognitivistic and action-oriented approach by Main, Kaplan, and Cassidy (1985), can perhaps help to further expand the model of inner representations of the developing child. If attachment theory begins to reorganize the internal working model from representing a central attachment figure (as in Bowlby's concept) to representing a set of event-based relationships, an infant's experiences of different relationships (the usual situation if the child grows up in a family) will also be represented differently in such a model. Experiences will then be organized by social events; actions and action outcomes will be associated with various relationships, not with persons. Main, Kaplan, and Cassidy suppose that

> *"The internal working model of attachment relationships will be organized out of the inner representation of the experienced outcome of actions or plans ('intentions') of particular relevance to attachment. This could lead, logically, in terms of conventional cognitive psychology, to an infinite variation in mental representations. We propose instead that, while aspects of each individual's representations of attachment are unique, the essential differences between individuals in representations of particular attachment relationships are finite and can be specified in terms of several central organizations"* (1985, pp.75-76).

Here the conclusion is drawn that types of attachment relationships are finite and most likely biologically based. Therefore, it may be expected that only a comparably small number of alternatives to seeking or maintaining proximity to a central caretaking figure exist. These authors state, however, that more complex patterns emerge by means of combinations that the attachment behavioral system forms with other cognitive or social reaction systems. The extension of the model would obviously have further implications: The child who grows up in a family builds up a multiple set of expectations based upon experiences of relationships with *all* members of the family. To learn more about these representations and the conceptualization of a multirelational model, one could draw upon descriptive devices that have been used in other areas where multiple relationships have been studied. Perhaps it is far too early to decide whether dimensions for family description can be used in attachment research, but thinking in this direction may offer some new guide-lines for future research.

A family attachment perspective could contribute to the acquisition of broader access to some of the still unresolved problems in interpreting attachment phenomena and to a better understanding of the ways families accomplish the tasks associated with the integration of a new child. Studying the interplay between family adaptation and children's developmental steps within the framework of family research may help us find possible baselines of attachment behaviors.

EMPIRICAL DATA FROM A LONGITUDINAL STUDY

The data to be presented here have been gathered in a study carried out with a view to delineating socialization processes in the family context. Although this investigation had another focus, some of its data may contribute to the elucidation of some general trends of families' efforts to integrate a new child, a task which can be strongly related to issues repeatedly raised in attachment research. The study's focus was on the interplay between the child's developing needs and abilities on the one hand, and the adaptation of the family to the new member's existence and changing behavior in every day situations at home on the other. Designed as a longitudinal study, it was also centered on the delineation of continuities and changes in family interaction patterns and socialization styles during the two year period after the birth of a second child. No experimental separations and reunions were arranged in the families, and therefore no categorization was attained of children according to their A, B, or C type of attachment. Nevertheless, for students of attachment it might be attractive to learn about general trends, such as shifts of socialization activities or continuities, and changes in the family's reorganizing efforts after the birth of the second child. A systems approach for attachment theory would require extensive information about continuities and changes in interaction patterns in normal families during the time they socialize and integrate their newly arrived child. As long as we do not know more about rhythms of normal integrative and socializing activities inside the family, we are unlikely to succeed in assessing what might be relevant in parent-child interaction preceding the various types of attachment behavior.

Method

Sample. Seven families were observed in their everyday life once a month during a two year period after the birth of a second child. The first children were between one and three and a half years old when the sibling was born. The families included in the sample were observed during everyday activities such as routine care-taking, playing with the children, eating a meal together, doing household chores, etc. It was intended to have all family members together and to observe their specific kinds of interaction, continuities as well as changes. Videotapes lasting between half an hour and one hour were obtained from every visit, and data were generated by using a set of categories for the description of various aspects of family interaction and socialization practices as they occur in short episodes.

Scoring procedure: Video material covering the two year period was partitioned into seven segments (6/8 weeks, 4/5 months, 8/9 months, 12/13 months, 16/17 months, 20/21 months, and 23/24 months after the birth of the second child). Two different observations, each one lasting about 30 minutes, were selected from each segment for balancing situational effects of observation. The segment-specific observations were then split into short episodes, each one lasting between 20-40 seconds. Thus, each family is represented by about 160-180 episodes per segment, yielding about 1100 episodes per family for the whole period.

Every single episode was scored according to 10 categories covering four different domains of family interaction: family structure, dynamics, socialization practices, and family specificity such as typical themes and emotional climate. In the first domain, family structure is determined by the varying constellations of the family members in every episode, such as dyads or triads formed by father, mother, and the two children (categories 1-3). The dynamics inside the family are delineated in the second domain by indications of initiative, target, and change of existing constellations (categories 4-6). Socialization activities inside the family encompass both structural and pragmatic characteristics of parent-child interactions (categories 7-8). Finally, family specificity is represented by an assessment of the family's communication theme and emotional climate in every episode (categories 9-10). Each of these categories is represented by up to 10 different items (for details see Kreppner, 1984); interrater reliabilities for the single dimensions vary between .65 and .98. In this report, only data from categories 1-3 (constellation), dynamics 4-5 (initiative and target), and finally socialization practices 7-8 (structural and pragmatic aspect) will be represented.

Statistical analysis: The categorical data are arranged in n-way contingency tables combining, for example, factors such as family, age of second child, initiator and target per episode; they are analyzed according to a best fitting parsimonious model. The method of log-linear model analysis (Bishop, Fienberg, & Holland, 1975; Fienberg, 1980) was applied for finding out the best model which fits the observed categorical data and estimates the number of relevant single factors or complex interactions of factors that can sufficiently describe the variations found in the tables.

Data analysis with the method of log-linear models is associated with a long searching process; many models which, from a theoretical point of view, might contribute to a plausible explanation are tested as to how capable they are of predicting the original data matrix. Eventually, after having found a model which seems to fit the data, parts of the matrix may be interpreted directly from the original frequencies in the contingency tables.

Results

Before going into further details concerning the variations of frequencies found in the contingency tables as they are described by various log-linear models, a formal aspect, the change of family constellations over time, will be presented.

Family constellations. Interactional changes within the family during the two year period can be revealed by analyzing the number of different constellations found in single episodes over time. The enlargement of the family after the birth of a second child proves to be not just a single change of relationships, but seems to be a rather complex and longer lasting process of reorganizing the whole family system. Theoretically, the existing triadic family with father, mother, and one child has three possible dyadic and only one triadic constellation(s). After the arrival of the second child, the change from a triadic to a tetradic formation begins. In a tetradic family, six possible dyadic and four triadic constellations, plus one tetradic formation have to be managed.

As empirical results reveal, only a relatively parsimonious set of configurations is found during the first months after the new child's birth. However, a peak of different constellations is manifest at about one year; after this, a slow decrease can be seen in the families' different constellations during the second year (see Figure 1).

This result is clearly in opposition to the concept of either a continuity or a sudden change in the family's relationships after the arrival of a new child. The figure illustrates the amount of time that elapses after birth, and signals how the family as a whole struggles to extend its relationship patterns and find a new balance.

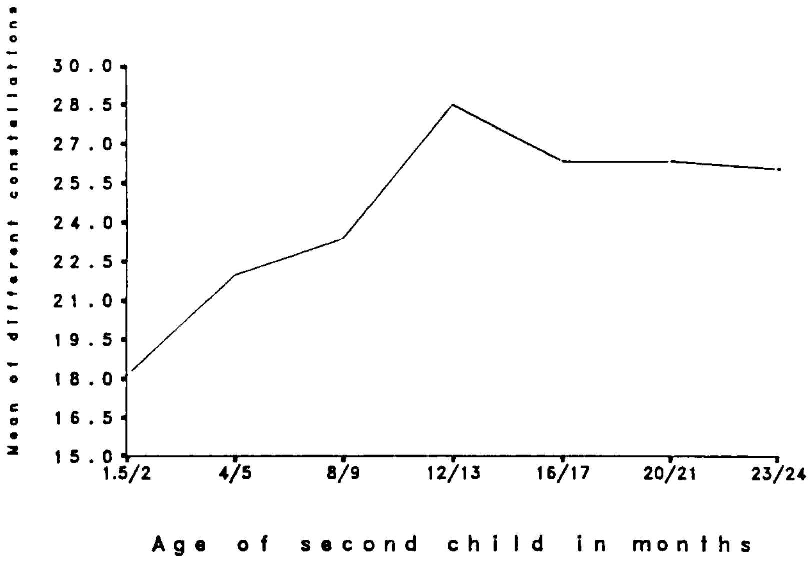

Figure 1. Family constellations over time (n=7)

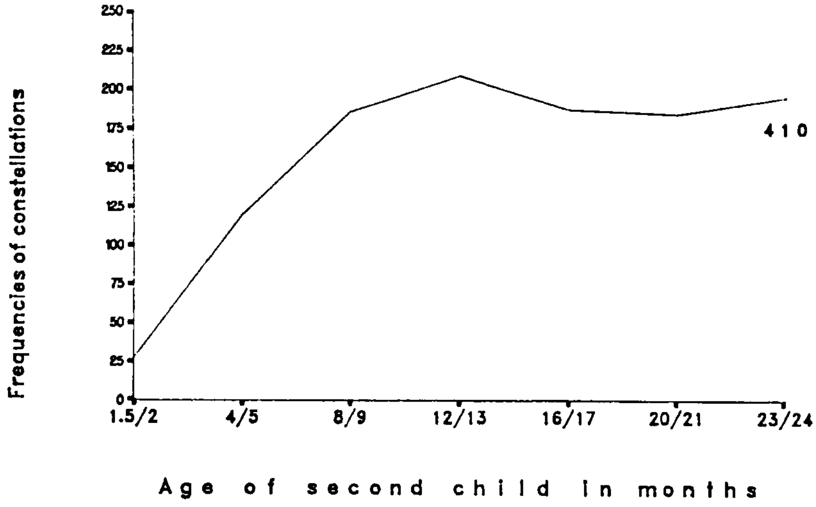

Figure 2. Family constellations over time (n=7). Constellation 410: Mother, father, child1, child2

To shed more light on this change of basic family interaction constellations, three of those occurring most frequently (only 12 constellations represent 64% of all constellations found) have been analyzed in more detail: first, the constellation 410, in which all family members are present but not interacting with each other at all (12.6% of all constellations), and second, two constellations, 427 and 428, indicating a "double dyad", either M-C2/F-C1 or M-C1/F-C2 (together 9.6% of all constellations), in which each parent is dealing with a child separately (see Figure 2).

A steep increase of the "non-interaction" constellation during the first year, and a levelling in the second year, are reminiscent of the curve exhibited by the overall occurrence of different constellations. It seems as if, after the first year, the family members return to a more relaxed kind of being together, allowing individual activities. As to both "double dyadic constellations", a decrease in the M-C2/F-C1 (428) constellation contrasts with a slight increase of the M-C1/F-C2 (427) constellation during the first year (see Figure 3).

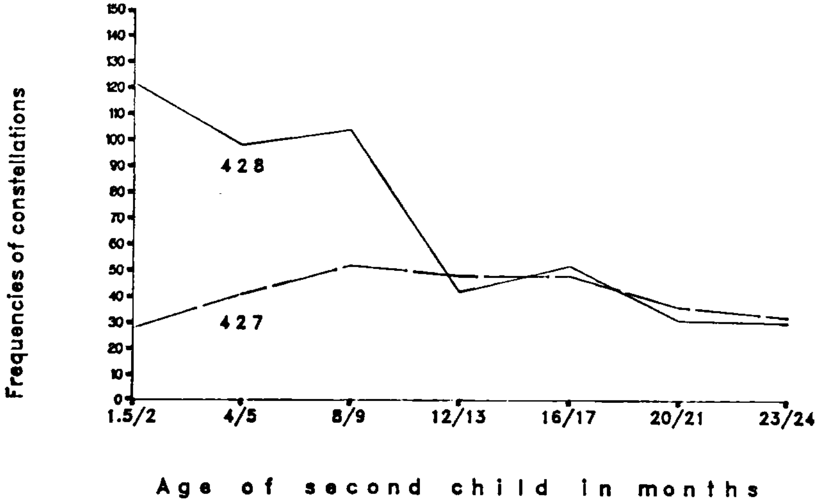

Figure 3. Family constellations over time (n=7). Constellation 428: Mother-child2, father-child1; 427: Mother-child1, father-child2

This comparison might be particularly interesting in the attachment context: the respective amounts of the interaction of the father with first and second child during the first year display a high degree of discrepancy. This picture changes completely in the second year: here the respective interactions between parents and children appear to be well balanced. The constellations unveil an amazing picture of the family's attempt to enlarge the existing interaction network, to adapt to the newborn's needs during the first year, and to find a new level of managing interactions in the second year. The complex rearrangement of the family structure from a triangular Mother-Father-Child configuration to a far more differentiated tetradic configuration Mother-Father-Child1-Child2 seems to be mirrored by these formal aspects of constellation changes over time.

Log-linear model analysis. In order to obtain a comprehensive picture of the relevant factors that might influence the families' interactions and socialization activities, five aspects were included in the procedure for finding a well-fitting model. Four aspects remained constant in all procedures: family (F), age of second child (A), initiator of the main action in an episode (I), and target of the main action in an episode (T). The varying fifth aspect to be included was the structural aspect (S) and the pragmatic aspect (P) of socialization.

This combination of aspects resulted in two five-dimensional contingency tables, one which included the structural aspect (F,A,I,T,S), while the other comprised the pragmatic aspect (F,A,I,T,P). For single factor models as well as for double-interaction models, no satisfying fits could be found.

Table 1
Log linear models, degrees of freedom, chi-squares, and probabilities for factors: Family (F), age of second child (A), initiative (I), target (T), and structural aspect of socialization activities (S)

	Model	df	chi-sq. (L-R)	*p*	chi-sq. (P)	*p*
1	FTS, FAI, AT	4227	9095.08	<.001	10349.51	<.001
2	ITS, FA, AT	4476	4958.29	<.001	5765.98	<.001
3	ITS, FA, FIT	4338	4272.02	.753	4734.87	<.001
4	IS, FIT, ATS	5469	4876.78	>.800	5587.36	.1292
5	ITS, FAI, FS	4302	3942.36	>.800	4378.67	.2036
6	ITS, FAI, FT	4284	3887.48	>.800	4325.88	.3234
7	ITS, FAI, FAT	4032	2396.74	>.800	3644.81	>.800
8	ITS, FIT, ATS	5412	3951.94	>.800	4359.69	>.800

Table 2

Log linear models, degrees of freedom, chi-squares, and probabilities for factors: Family (F), age of second child (A), initiative (I), target (T), and pragmatic aspect of socialization activities (P)

	Model	df	chi-sq. (L-R)	*p*	chi-sq. (P)	*p*
1	FIT, FAI, FAT	3493	6849.19	<.001	7274.69	<.001
2	FAT, FAI, FTP	3535	6968.99	<.001	8833.22	<.001
3	FIT, FAI, FTP	3654	3657.40	.481	4028.62	<.001
4	ITP, FAI, FAT	3552	3322.76	>.800	3745.00	.012
5	ITP, FAI, FAP	3984	3782.50	>.800	4248.76	.013
6	ITP, FAI, FTP	3726	3510.03	>.800	3897.12	.025
7	AITP, FAI, FTP	3246	2746.03	>.800	2866.45	>.800
8	TP, FAIT, FAP	2830	2386.57	>.800	2488.05	>.800

In separate search procedures a set of triadic interaction models were finally obtained for both socialization activities (S and P), which had many interactions terms in common, but varied considerably according to their degree of fitting. As can be seen from Tables 1 and 2, very similar models were obtained for the two contingency tables.

From a multitude of three term dyadic and triadic models which were estimated for both S and P combinations, those eight are presented in Tables 1 and 2 which had both identical terms (such as FAI) and common triple terms for the S and P variable (such as ITP and ITS). The two models which were finally selected had probabilities greater than .01 in both assessments (Likelihood Ratio and Pearson X^2), but were not too exhaustive, that is, had a *p* smaller than .80 according to the more conservative probability assessment of Pearson X^2. They are presented below.

ITS FAI FT

ITP FAI FTP

These models can be interpreted as being parsimonious descriptions of very complex overall trends in early family socialization. Firstly, the middle term FAI which contains no socialization activity at all, might indicate a socialization-independent but family and age-specific initiative-taking aspect. Thus, for example, turn-taking rituals can be regarded as being family-specific as well as age-specific, irrespective of the concrete contents of interaction. Thus, these results might signal some implications for attachment theory: Early childhood socialization should not be interpreted without taking into account the specificities of family interaction rituals on the one hand, and the age of the child being socialized on the other.

Secondly, the other triple term, common in both models, is ITS and ITP. This term indicates that socialization activity is dependent on both initiator and target, but not on age and specific family interaction rituals. Thus, whereas in FAI family and age specific initiatives are reflected, both ITS and ITP terms mirror dyad-specific socialization activities. The third term differs in both models: the model containing the structural aspect has only FT, whereas the model for the contingency table with the pragmatic aspect has the term FTP. The common interaction term FT in both models can be seen as pointing to the family specificity when a child is being addressed in social interaction activities, or vice versa, when a child addresses a parent, or when parents as well as children are interacting with one another. It should be stressed that the three term model as a whole is in disagreement with one of attachment theory's main assumptions, namely that mother specificity and to a certain degree father specificity *alone* could explain the differing types of interaction patterns between parents and children during the earlier years. If this were so, a simple interaction term IT or something similar would yield a well fitting model. But as emerged when drawing the search procedure without the terms FAI and FT, no sufficient fit of a model could be found. It should be mentioned that the terms ITS and ITP indeed point to a socialization-specific initiator-target behavior which is independent of family style and perhaps can be delineated as an indicator of typical parent-child and child-parent interaction. This term obviously contains part of the variance usually taken as being the total relevant variance in attachment research. But, as is shown in this log-linear analysis procedure, two other terms have to be added to sufficiently describe the variance found in the contingency tables.

Family dynamics. Categorical data analyzed by the method of log-linear models are presented in more detail in the following section. As for the analysis of constellations, the focus here will also be on general trends of the families' interaction patterns over time, and not on family-specific variations. In terms of the log-linear model, this means a closer look at the IT and AI combinations, disregarding the F-factor. For finding out baselines for age-specific kinds of family interaction, changes of inner-familial interaction can be reconstructed by counting the number of different target-specific initiatives of the various family members during the two year period. For example, the intensity of mother-child2 interaction in comparison with the father-child2 interaction may reveal time-specific patterns of dynamics inside the family (see Figure 4).

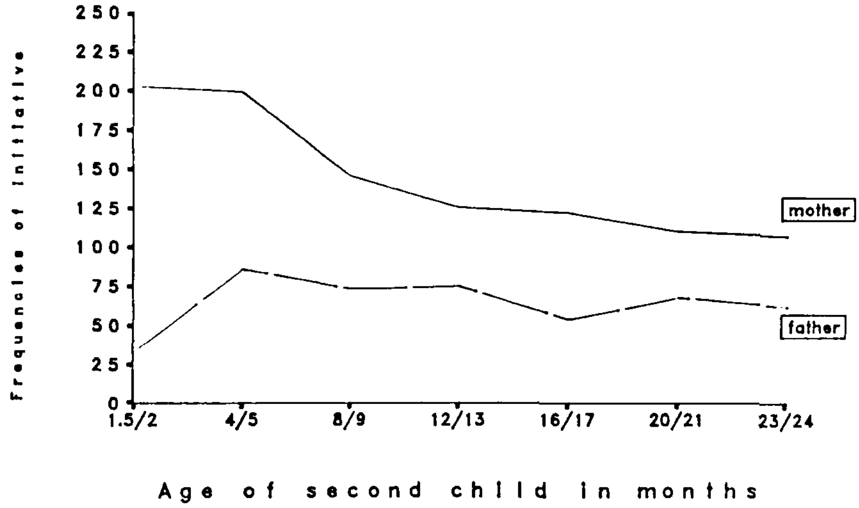

Figure 4. Family interactions over time (*n*=7). Initiator: mother, father; target: child2

The obvious differences between mother-child2 and father-child2 interaction immediately after the birth of the child might explain the usual impression that the mother has an overriding role for the new member and its development. However, towards the end of the first year a sharp decrease in the intensity of the mother-child2 dyad is noticeable (see Figure 5). The comparison of child1 and child2 according to the frequencies of being targets of a parent's initiative reveals that the mother prefers child2 over child1 during the whole period, but differences are particularly clear during the first eight months.

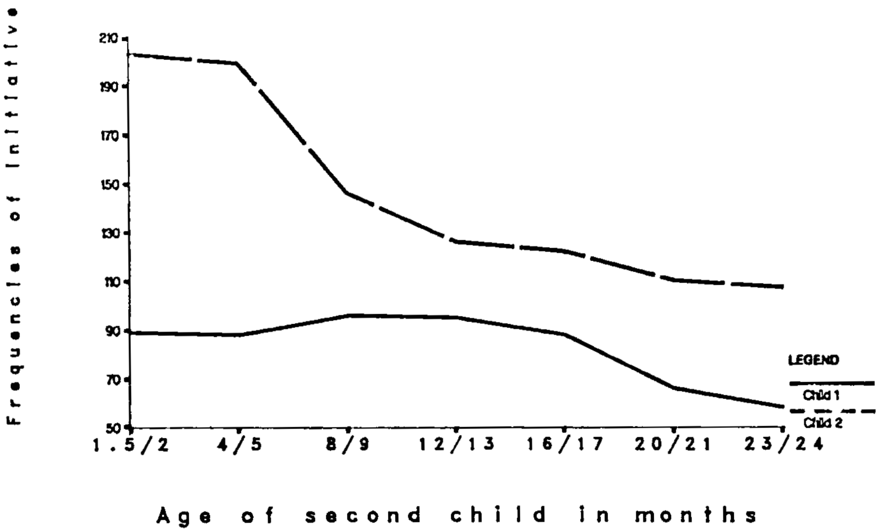

Figure 5. Family interactions over time (*n*=7). Initiator: mother; targets: child1, child2

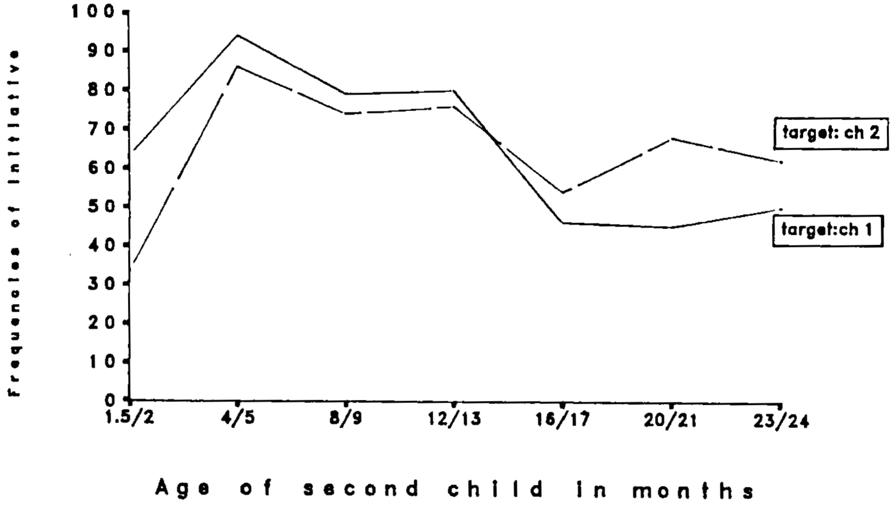

Figure 6. Family interactions over time (*n*=7). Initiator: father; targets: child1, child2

Figure 6 illustrates that the father has a different role as initiator with the two children; he is increasingly and nearly equally involved with both children during the first year. In the second year, the father begins to prefer the second to the first child. Thus for the first child, this period, when the second child becomes attached to both mother and father, must be rather difficult. This process comprises not only phases of parent-child1/child2 initiatives, but also child1/child2-parent initiatives.

As to the second child's changing initiatives over time, a steady increase after the 4th month for the child2-mother initiatives contrasts with a much steeper increase from a low frequency at 8 months to a comparatively high frequency at 16 months in the initiatives of the child2-father interaction (see Figure 7). They remain high during the second year, having a culmination at 21 months, when the second child is turning more often to the father than to the mother. This points to a far more complex mechanism of inner-familial consolidation than the one usually described in attachment processes between a child and only one primary caregiver.

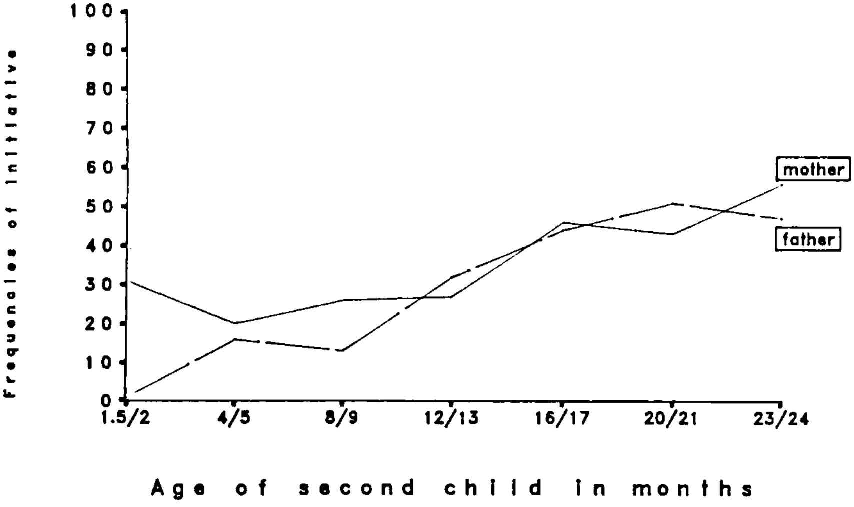

Figure 7. Family interactions over time (n=7). Initiator: child2: targets: mother, father

A family-oriented way of looking at possible precursors of the attachment process reveals a multidirectionality of initiative-target interactions during the first two years after the arrival of a new child on the one hand, and a change of initiative-target patterns inside the family on the other. Dynamics as depicted by the various initiative-target changes vary markedly during the first year, but seem to reach a certain degree of balance toward the end of the second year, pointing to a successful reorganization of the family's interaction patterns.

As was stressed while presenting changes in family constellations, time-specificity seems to play an important role in assessing inner-familial dynamics. Seeking a new balance for all family members implies the re-establishment of relationships and finding a new modus vivendi. Consequently, the process of integrating the new child has to begin before a new structure is found. Thus, the procedure of negotiating one's own position (as a kind of family task) until a new equilibrium is re-established can be regarded as a starting point for describing differences in the family's ways of integrating a child and finding a new balance. This may also be relevant for finding differential precursors of certain types of attachment behaviors.

Socialization activities inside the family. The final set of data to be discussed, consists of combinations of the age of the second child, initiative, target, and, finally, integrative or controlling socialization activity. Whereas conspicuous differences were found with respect to changes in parent-child and child-parent interaction dynamics, the other two sets of relationships in a tetradic family (parent-parent and sibling-sibling interactions) did not display marked changes or differences. The analysis of a more specified table of frequencies may yield more information about these particular relationships.

Having discussed the IT and AI interactions in the last section, we consider the ITS triple interaction of interest for looking at possible changes in parent-parent and sibling-sibling interactions.

Whereas integrative socialization activities among siblings are too infrequent to be considered here, analysis of controlling interaction reveals that the two children seem to focus on one another a great deal during the second year (see Figure 8).

Although not showing much integrative behavior toward each other, siblings seem to establish a relationship of their own, thus contributing to the organization of new interaction patterns aside from the usual parent-child pattern. As to the

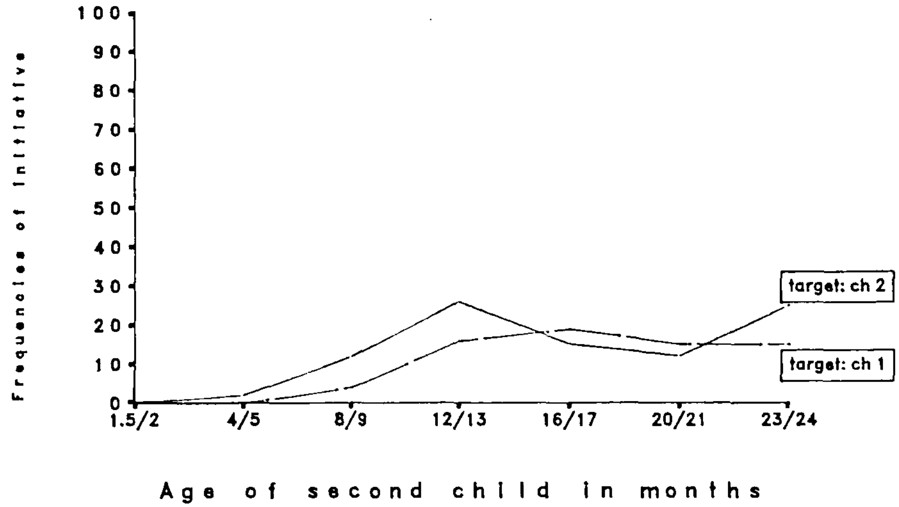

Figure 8. Social control over time (*n*=7). Child1 to child2 and vice versa

parent-parent activities, mutual controlling behaviors are very infrequent during the whole period and can be neglected. Integrative interaction, however, shows a definite increase at the 4th/5th month as well as at the 20th/21st month (see Figure 9).

These two peaks during the two year period indicate efforts of both parents to maintain their specific relationship at particular times. Finding of a new balance, of course, requires a kind of *rapprochement* between spouses at critical periods. Whereas at 4/5 months after the birth of the second child the impact of the new task of caring for two children and involving the father more may influence the marital relationship, the higher frequency of parent-parent interactions at the end of the two year period perhaps points to efforts to find a new balance inside the family. This is accomplished by increasing the frequency of parent-parent interaction after a relatively long period in which parent-child interactions dominated the family's life. The occurrence of increased

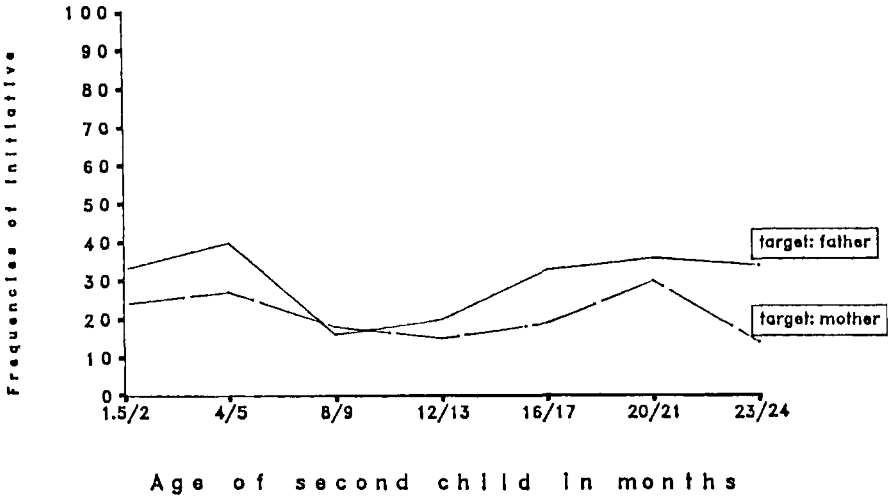

Figure 9. Social integration over time (*n*=7). Mother to father and vice versa

interactions and communications between the parents at the end of the second year signals, perhaps, the beginning of a new era in the family's relationship network, accompanied by setting new boundaries for familial subsystems, the parent-subsystem and the children-subsystem. This process may be seen as a very important precondition for the further development for both the individuals and the system as a whole.

In summary, the process of integrating and socializing a new child touches upon *all* relationships inside a family. In the case of a two-child family, the mother's involvement with the second child during the first year decreases considerably after the first months, but there remains a certain degree of preference for turning more frequently to the second child as compared to the first one over the entire two year period. In addition, the father seems a little bit more involved with the first child during the first year. This can be understood as a possible compensation for the mother's involvement with the new child, which contributes to stabilizing the family during its change from a triadic to a tetradic system. Furthermore, during the second half of the second year, the new child, having grown considerably in cognitive and communicative skills, increasingly takes initiatives of his or her own and thus struggles for gaining a well-accepted position within the family. Finally, the increment of mutual interaction between siblings during the second year and between parents during the 16th/17th and 20th/21st months can be interpreted as being part of a successful family reorganization in the second year after the child's arrival.

CONCLUSIONS

Looking at these results, one could discuss various aspects which touch upon attachment research; for example, the changing of family constellations over time, the decreasing intensity of mother-child2 interaction, and the increasing attractiveness the father gains for the second child. All these events highlight some general socialization trends inside the family which could shed some new light upon some of the classical experimental conditions in attachment research.

Future attachment research might take better account of developmental changes in social behavior at particular critical periods; it might take the reorganization of family interaction during the first two years more seriously, while planning experiments on preferences of mother and father with children in the ages between 8 and 24 months.

In addition, a systematic description of the family's internal rearranging procedures during the integration period could contribute to a better understanding of the kind of scenario the child is confronted with when he or she is constructing an internal working model. The way the family handles the problems associated with the establishment of a new balance is very likely to influence the social and emotional experiences of the child, perhaps forming the blueprint for the child's social and, more specifically, attachment behavior.

The widening of the dyadic attachment concept by proposing a more family-oriented view may, in the long run, also contribute to the introduction of two other issues of developmental psychology to the domain of attachment research: adolescents loosening ties with their families and developmental psychopathology.

The problem of loosening ties with parents has been amply discussed in youth literature (Murphy, Silber, Coelho, Hamburg, & Greenberg, 1963; Shapiro, 1972; Stierlin & Ravenscroft, 1972; Sullivan & Sullivan, 1980), and some attempts have been made to link it to the attachment phenomenon (Cohler & Geyer, 1982). A life-span oriented conception of family development may also provide new guide-lines for constructing a family attachment concept, for example, one with a polyadic view.

Just as attachment focuses on the integration period in early childhood, a complementary conception of attachment and detachment during late childhood and early adolescence could concentrate upon the "launching stage" (Olson & McCubbin,1983) in the family's life course, as the grown children begin to leave home and parents once more have to rearrange their family interactions. Much like the attachment process during the early years of infancy, detachment in later childhood and adolescence can be looked upon as a highly emotional process which perhaps is as important for the development of the self as is the primary attachment process. Although no studies have been conducted so far which aim directly at the detachment process, a family-directed approach could contribute to elucidating some of the context-related issues in adolescence research.

After a broader concept for analyzing relationships has been established, another extension of attachment research could possibly consist of linking attachment behaviors with clinical symptoms as they occur in childhood or early adolescence. The work of family therapists can be used for finding out new ways to categorize and interpret phenomena from the field of "normal" development-in-context (Minuchin, 1985). Endeavors of clinicians to link developmental psychology to psychopathology (Achenbach, 1984; Sroufe & Rutter, 1984) may lead to a more context-related view of attachment phenomena as well. Thus, the conceptualization of family attachment as a widened view on the process of developing secure or insecure bonds to the proximal caregivers, combined with a family-developmental perspective may help to bring us a little closer to a more thorough understanding of the complex interplay between the individual child and his or her context during the course of development.

Notes:

1. The empirical research reported in this chapter is part of a project which was carried out in collaboration with Yvonne Schütze. I gratefully acknowledge the helpful contribution of Alexander von Eye to the statistical analysis of the data. I want to thank Christiana Brunke and Holger Wessels for their assistance in computing the data, and I appreciate all the raters who helped to produce the data from the videotapes.

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ATTACHMENT IN SOCIAL NETWORKS
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CHAPTER 7

ATTACHMENT AND THE BIRTH OF A SIBLING: AN ETHNOGRAPHIC APPROACH[1]

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ABSTRACT

In a qualitative study on the effects of the birth of a second child, five families were observed weekly for a period of about eight months. Before and after the birth, the quality of the attachment relationship between firstborn child and both its parents was assessed in a modified Strange Situation procedure. A network of secure attachments proved not to guarantee a flexible adjustment to the changed family system. A more intensive participation of the father in the care of the child appeared compatible with an improvement of the attachment quality. Three years later, the five families participated in a follow-up study. The adjustment of the anxiously attached child to the changing family system seems - also for a longer period of time - more adequate than that of the securely attached child. On the level of the socio-emotional adaptation, however, the securely attached child has an advantage over the anxiously attached child. This is also the case with respect to intelligence.

INTRODUCTION

The birth of a second child creates a complex network of relationships in which parents and siblings have to find their place. The parents will often try to compensate for the increased "workload" by changing the established division of household and caregiving tasks. The father, for example, might participate more actively in childrearing than before (Krepp-

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ner, 1983). The firstborn child, in its turn, has to get accustomed to sharing the available time and energy of the parents with the baby. This usually happens at a time when the child has established a firm and stable relationship with its parents; changes in such a relationship will not pass by unnoticed. Feelings of envy and aggressive behavior towards the baby indicate that the child considers itself threatened by the "intruder" (Dunn & Kendrick, 1982).

In this qualitative study we want to gain more insight into the effects of the birth of a second child on the firstborn's attachments. From the attachment theory formulated by Bowlby (1971; 1973; 1980) and Ainsworth (Ainsworth, Blehar, Waters, & Wall, 1978) we derive the hypotheses for our study. The most important questions are: 1) which changes in the network of attachments are taking place in a period of adjustment to the birth of a sibling, and 2) how are these changes connected with the frequency and quality of the interactions with the parents. In addition to these broad questions, we formulate two concrete hypotheses:

1) A network of secure attachments before the birth of a sibling leads to a more adequate adjustment to the changed family system than a network with one or more anxious attachments.

2) Under certain conditions concerning the quality of the interactions, a more active role of the father in child-rearing is beneficial to the quality of the attachments of the firstborn child (Van IJzendoorn, Tavecchio, Goossens, & Vergeer, 1982).

In this study, we explore the plausibility of these expectations and suppositions. We do not intend to *test* these hypotheses in a definitive way. We need and use hypotheses for the description of negative evidence. Besides this description, new suppositions and hypotheses are generated , based upon the qualitative data (heuristics). In our view, more controlled and larger-scale studies will have to be utilized to test such discoveries.

The research design reflects our goal of "falsification" and heuristics. We chose an interrupted time series design with five replications. The data were collected by the method of semi-structured participant observation. The data were analysed by means of a new version of content analysis, based upon the work of the ethnographer Spradley (1979; 1980).

METHODS

The sample

Midwives recruited the subjects for this study, asking clients (those who were 6 months pregnant and who had one child, about 18 months old) if they were willing to participate in our research. Five families from different socio-economic backgrounds took part in our project, requiring some 35 weekly observations of the family interactions around suppertime.

A brief description of each family follows.

Family 1. The father, who was 35 years old at the beginning of the observations, works as a technician. The 32 year old mother was a student, during our study she was a housewife. The division of tasks in this family is arranged traditionally: the father earns the household living, the mother takes care of the children. However, during our study the father had a leave of absence of 3 months, a period that fell partly before and partly after the birth of the second child. In those 3 months, the father took over the care of the eldest child. Generally, the parents get about with each other quietly and unobtrusively. They are friendly to one another, listen to each other, and sometimes the father advises the mother. Nevertheless, they are not on the most intimate terms and neither seem satisfied with the present state of affairs.

The firstborn child is a boy, 71 weeks old at the beginning of the observations; sex of the baby is female.

Family 2. The father, who was 35 years old at the beginning of the observations, works as an employee. The 25 year-old mother was a group-leader, now she is a housewife. The father regularly helps the mother with household tasks when he is at home . The traditional division of tasks hardly ever gives occasion to conflicts, both parents seem satisfied with this arrangement. The parents interact in a spontaneous, cheerful and relaxed way. However, the mother is occasionally bad-tempered, she is grumpy and easily irritated, and this has repercussions for the atmosphere in the family. Sometimes there are conflicts between the parents, for example with respect to which strategy has to be followed when the baby is crying. The mother comforts the baby when it cries, whereas the father wants the mother to let the baby cry now and then.

The firstborn child is a boy, 99 weeks old at the start of the observations; sex of the baby is female.

Family 3. The father, who was 29 years old at the beginning of the observations, works as a teacher. The 29 year-old mother was also a teacher in the past, now she is a housewife. In this family, too, the division of tasks is arranged traditionally: the father earns the money, the mother looks after the children. During our study, the family had several dwelling-places. The parents had sold their old home and bought a new one. The latter, however, is not yet ready so they stay at the homes of members of the family, where the father does not know his way about. Consequently, many household tasks are the responsibility of the mother. She is not particularly fond of this increase in tasks. The parents interact in a very quiet way. They are distant with each other and their feelings show frictions. For example, the mother is very interested in the work of the father. She misses her job, but the father ignores this kind of feelings in the mother. However, real conflicts hardly ever occur.

The firstborn child is a boy, 59 weeks old at the start of the observations; sex of the baby is female.

Family 4. The father, who was 30 years old at the beginning of the observations, is a student. The 30 year-old mother was once a dancer, now she is a housewife. There is neither a traditional nor a clear-cut division of tasks. The father is often at home, the mother is frequently out. There is no regular pattern to the performance of household tasks; the father often attends to these tasks and engages in the care of the children. Since the birth of the eldest child the parents try to share child-rearing, a condition the mother stipulated for starting a family in the first place. The father never thought about these things, he had some hazy notions but not concerning the division of tasks. In any case, a full-time job for one of the partners is not acceptable. The state of affairs seems satisfactory for both parents, they never quarrel about this matter. The parents are on good terms; they communicate well and seem to understand each other's feelings. The only difference of opinion, which is an important one, concerns the handling of the baby. The mother wants to pay attention to the baby when she cries, whereas the father thinks it is not necessary to comfort the baby every time. Sometimes the parents quarrel about this subject.

The firstborn child is a boy, 73 weeks old at the start of the observations; sex of the baby is female.

Family 5. The father, who was 28 years old at the beginning of the observations, works as a docker. The 27 year-old mother was a home help formerly, now she is a housewife. The division of tasks is arranged traditionally: the father earns the money, the mother looks after the children and the household. The father is often engaged in household tasks and in the care of the children. However, the parents meddle in the pursuits of one another, and they both dislike their mutual interferences. Generally, the atmosphere in the family is even, cheerful and relaxed. Although the parents do not interact very emotionally, they do care for each other. The interaction between the parents crystallizes more in activities than in words. In spite of the harmony within the family, the parents dispute their respective rights to have a say in financial matters or in the performing of household tasks. Real conflicts do not occur in this family, but the opinions differ with respect to the handling of the baby. As in the other families, the mother is more inclined to comfort the crying baby and to keep it company than the father.

The firstborn child is a girl, 94 weeks old at the start of the observations; sex of the baby is female.

The research design

We used a so-called "interrupted time series design" (Cook & Campbell, 1979) with five replications, in which the "interventions" (the birth of a sibling) took place at different points in time in 1982. A control group without the birth of a second child is absent. Strictly causal conclusions cannot be drawn, for the effects of maturation and of the birth of the baby cannot be separated. Three observers paid 1½ hour visits a week to the same one or two families, and collected data through participant observation. The number of visits before delivery varied from 12 to 15 and after the birth of the baby from 14 to 29 (see chapter 8, this volume).

Participant observation is characterized by permission to have a look into the daily life of the subjects. The observer collects his data through participation in the subjects' life, functioning not only as watcher, but as perceiver as well (Plooij, 1978). The participant observer studies his subjects for the purpose of knowing which situations are customary for these subjects and how they behave in those situations. By entering into conversations, the participant observer tries to gain insight into the subjects' interpretations of events.

The participant as observer can mix with his subjects in different ways. Analysis of the interactions between observers and parents in our study showed that the observers played four roles: a) student; b) friend of the mother; c) expert; d) friend of the father.

The role of a student and the role of an expert are obvious. The parents know that the observer is a student or a graduate, and as a result of that information they push the observers into the corresponding roles. Only in the course of time can these roles develop into the role of a friend. It would be best if *both* parents considered the participant as a friend. Not until then can the danger be avoided that the observer obtains different information from the parents, merely on account of their view of his role in the family. Roles, once accepted, are exceedingly durable. Changing a once established relationship (from a friend of the father to a friend of both parents, for example) appeared to be practically impossible in our project, implicating a limitation of the validity of this study.

The data collected through observation were supplemented by information from spontaneous communications with the subjects, and from semi-structured interviews. The participant observation, including the conversations and interviews, was focused on a few topics guiding the observational reports. These topics were derived from our research questions and concerned:

- interactions between parents, child and baby
- interactions between observer and the family
- interactions of parents and child with visitors
- parental perceptions of the child's behavior and development
- parental perceptions of the role of the observer
- specific developmental problems such as slow language development, sleeping problems, etc.
- the parents' goals and intentions with respect to the upbringing of their children
- the family's history
- divisions of tasks
- parental ideas about the future of the child

During the visits, these topics were only present in the minds of the participant observers. When visiting the families, the participant observers did not make use of paper and pencil to record their observations. Immediately after the visit, they wrote the observational reports with the aid of the topics to guide the division into paragraphs. Consequently, the reports of the different observers had the same structure. Furthermore, in each report one part was reserved for the description of situations not included in the list of topics, but which seemed important enough to be mentioned. Using a list of topics only as an aid to observe relevant situations, and as a means of producing reports of the same form constitutes the *semi*-structured character of our approach. Thus, collection of the qualitative data was not carried out in a strictly standardized way.

PROCEDURE

Content analysis

The data in our study were collected in a semi-structured fashion. Consequently, data analysis took place *after* data collection. Four topics, chosen on theoretical grounds, guided the data collection, and functioned as main categories in the analysis:

1) attachment;
2) reactions to the birth of the baby;
3) interactions between parents and child;
4) interactions between family and observer.

The choice of the first 3 main categories is obvious in view of the object of the study: the influence of the birth of a second child (category 2) on the attachments (category 1) and interactions (category 3) between parents and firstborn child. The fourth main category, interactions between family and observer, is important for determining the influence of the observer's role in the family on the quality of the data (see previous paragraph).

On the basis of the observational reports, these four main categories were differentiated into subcategories. The main category attachment included, for example, the subcategories:

a) anxiety in strange situations
b) affection of the father for the child
c) attachment behavior at home
d) history of attachment

After completion of the category system, and after defining the categories, the observational reports were coded. The letter representing the relevant subcategory was placed near every sentence or paragraph including an event or interaction of that kind (definitions of categories can be obtained from the authors).

Intercoder agreement

The intercoder agreement for the categorization was determined by a random sample of 16 reports (=9% of all reports). A second coder categorized independently the observational reports according to the coding system. The intercoder agreement was 76%. For the main category attachment, this agreement was 83%, for reactions to the birth of the baby 91%, for interactions between family members 89%, and for interactions between observer and family 93%.

In this study, only the intercoder agreement was determined. Neither in the next phase of the study (taxonomic and componential analyses) nor in the previous phase of data collection, were reliability-tests carried out. With respect to the interobserver agreement, however, the variation in number of observations between families appeared to be larger than between observers. This could be taken as an indication of the objectivity of the data collection, for the family instead of the observer caused the variation in number of observations.

Taxonomic and componential analysis

After the domain analyses, in which all the bits belonging to particular subcategores were catalogued, taxonomic and componential analyses (Spradley, 1979; 1980) were carried out. The dimensions of the taxonomies, giving structure to the global domain, were used to count the frequencies of behavior in each family before and after the birth of the baby (the taxonomies can be obtained from the authors). In the componential analysis, the families were then compared on the basis of these frequencies. A question of the componental analysis in the domain "affection of the father for the child", for example, is: Does the father cuddle his child seldom or often, compared to the other fathers in the study. In the componential analysis, the frequencies on the taxonomic dimensions were interpreted. These interpretations - infrequent or frequent occurrence of behavior - were used to compare the 5 families, and to contrast the periods before and after the birth of the sibling within each family. In the next step, profiles of each family were constructed, based upon the comparisons in the componential analyses.

The Strange Situation

Apart from the qualitative study, the firstborn child and both its parents were seen in a modified Strange Situation procedure, two months before and two months after the birth of the sibling. In the first episode, father, mother and child are in the playroom. In the second episode the father leaves the room; in the third episode the father returns to mother and child; in the fourth episode the mother leaves, returning in the fifth episode. In the sixth episode both parents leave, returning together in the last (7th) episode. Each episode lasts about 3 minutes; behavior is recorded on videotape, and analyzed with the interactive scales of Ainsworth and colleagues: proximity seeking, contact maintaining, avoidance, and resistance (Ainsworth et al., 1978). Intercoder agreement for these interactive scales ranged from .88 to .99 for the fathers, and from .82 to .97 for the mothers.

In accordance with Waters, Wippman, & Sroufe (1979) the quality of affective sharing between parents and child in the pre-separation episodes was also coded. Intercoder agreement was 93% for the fathers, and 80% for the mothers. On the basis of the scores on the interactive scales and on affective sharing, the children were classified into four attachment categories: anxious-avoidant (A), secure (B), anxious-dependent (B4), and anxious-resistant (C). There was 100% agreement between two coders on this classification in 15 cases. For details regarding the modified Strange Situation procedure see Vergeer (1986).

After the construction of the profiles, the results of this Strange Situation procedure (unknown to the qualitative researcher until then) were related to the outcomes of the qualitative study. Instead of looking for cultural themes, as Spradley advises in a last step, our study ends with the relating of outcomes from a study in the natural setting to results of a standardized laboratory procedure.

RESULTS

Profiles

Family 1. The child often seeks physical contact with and proximity to the parents. Before the birth of the baby, this contact seeking occurs in a clinging and whining manner from time to time, especially when the father is on a business trip. After the birth of the sibling, this clinging behavior decreases. Anxiety with strangers is apparent during both periods of observation. The child clings to the father or the mother when someone is visiting the family. For a long time he is afraid of the observer as well. Although the child, compared to the other children, infrequently interacts with the observer, the number of interactions increases after the birth of the baby.

The mother thinks her eldest child is drawn more towards the father after the birth of the sibling. During his leave of absence the father indeed takes full responsibility for the care of the firstborn child. To the father's mind, the child requires a lot of attention. He thinks the child is more troublesome and moody than before the birth of the baby, and he attributes this behavior to jealousy. In general, common interactions between parents and child, such as verbal interactions, play, etc., do not occur very frequently. After the sibling's birth, however, parents and child play a lot more than before.

The pedagogical style is more directive after the delivery. The parents stimulate and punish the child more and allow less. The mother is worried about the slow language development of the child, and after the sibling's birth she tries to stimulate his speech. Regularly, the child has to point out and mention the names of animals depicted on a placemat.

Although the mother did try to prepare the child for the baby's birth by telling about the baby and by letting him feel her belly, she thinks he did not understand much of it. Now, after the delivery, the child is very sensitive to interactions between parents and baby. He immediately crawls to the caregiving parent. After some time, the reactions become more forceful and aggressive. For example, the child hurts himself intentionally, and starts crying to attract attention of the mother, who is feeding the baby. Or he hits the mother as soon as she gives attention to the baby. Three months after the birth of the baby, his aggression is directed toward the baby. Sometimes he is crude to the baby: he slaps her, tries to jab her in the eyes, pushes her head. Therefore, the mother puts off feeding and bathing the baby as much as possible until the firstborn child is asleep. Interactions between child and baby do not take place frequently. Compared to the other children, he shows little interest in the baby. He rarely takes the initiative in interacting with the baby.

Family 2. The child seeks physical contact infrequently but positively, for example, talking with the parents while sitting on their lap. After the birth of the sibling, proximity seeking increases; the child sits near the parents more often than before the birth of the baby. The child is neither afraid of strangers (he offers toys to visitors) nor of the observer. After the birth of the baby the number of interactions between child and observer increases. For the child the observer is, above all, someone to play with. After the birth of the baby the father often cuddles the child. Sometimes the child rejects these caresses. The father adequately comforts the child when the latter is upset or hurts himself.

Before the sibling's birth, the child was called "a normal little fellow", although he was often naughty and did have bad moods. After the delivery, however, the mother only mentions negative aspects: the child has sleeping problems, he protests a lot and is getting naughtier every day. The parents, who have a directive pedagogical style, try to regulate this behavior and demand more independent behavior of the child. He has to learn to handle cutlery, and he is expected to be toilet-trained within one week. The child, therefore, does have a heavy "workload", and perhaps this is the reason why the number of flagging interactions increases.

The paternal participation in the care of the firstborn child does not increase after the birth of the baby, but the father's share was already large. Compared to the other families, parents and child interact very frequently. Especially after the birth of the baby parents and child talk a lot. Noteworthy is the high frequency of playful interactions. Furthermore, the child likes to be mother's helper.

During the last two months of the pregnancy, the parents talk a lot about the baby. The mother tells the child about bathing and feeding the baby. The first weeks after the delivery, the child interferes playfully in the interactions between parents and baby. For example, the child comes to play "having tea" with mother and baby when the mother is feeding the baby.

About two months after the baby's birth, the child wants to get more attention from the mother. For example, he asks her questions or does naughty things when she feeds the baby. The child sometimes behaves aggressively toward the baby: he tries to sit on top of the baby, he pushes the baby with his feet. The parents play down this behavior, the mother repeatedly tells the observer that "he means no harm". Nevertheless, the parents do punish the child for this kind of behavior. The child interacts frequently with the baby. He likes playing with her. In his play with the baby, the child pretends to give her a bottle, for example. Other interactions are generated by the parents by putting the baby on the child's lap. In such situations, the child cuddles the baby: he kisses her, caresses her and talks to her.

Family 3. The number of times the child seeks physical contact and proximity increases after the birth of the sibling. This contact seeking frequently occurs in a whining way; the child begins to cry when father or mother leave the room, for instance. Compared to the other fathers, this father infrequently cuddles the child, but he does play rough-and-tumble games (play with bodily contact). After the birth of the baby, the child itself initiates this kind of games with the father.

Before the birth of the sibling, the child sometimes began to cry when picked up by visitors. After the birth of the baby, however, he is no longer afraid when confronted with strangers. Neither before nor after the birth of the baby is the child afraid of the observer. Compared to the other children, he often seeks physical contact with and proximity to the observer, especially after the birth of the baby. In spite of the fact that common interactions between observer and child do not take place frequently, the child does direct attachment behavior toward the observer.

The mother has high expectations of the child's development, but she is rather insecure about caregiving. The father feels more secure. Although they both try to be responsible for the firstborn child, in practice the father is more engaged in the care of the elder child, while the mother mainly cares for the baby. The parents think their child easy-going and obedient. The parents tend to interact only superficially with the child, perhaps because of his inconspicuous behavior. For example ,they comment on his behavior without involving him in their interaction. Especially after the birth of the baby, such indirect interactions occur frequently. The parents also play very infrequently with the child, and they do not actively stimulate his language development. With respect to talking, the parents have adopted an attitude of wait-and-see.

The low frequency of common interactions, and the superficial way of interacting, do not imply a permissive pedagogical style. On the contrary, frequent punishment is quite characteristic of this family. Before the delivery, the child was usually punished verbally. However, after the delivery the parents more often punish him physically, for instance, by rapping his fingers or by shaking him.

The parents try to prepare the child for the sibling's birth as in the other families, but the child does not seem to understand much of what is being said. After the delivery, the child very often interferes in the interactions between parents and baby. In the beginning, the parents tend to ignore the child in these situations. For instance, they push the child away, when occupied with the baby. After some time, the mother realizes that she is not giving the eldest child enough attention when handling the baby. From that moment, the parents involve the child more in their interactions with the baby, and the number of times the child draws attention decreases. The child's interaction with the baby is not influenced by these developments. Especially in the first few months, the child regularly interacts with the baby in a tender way. He is the only one out of the five children who comforts the baby more than once when she is crying. At three months after the delivery, the child sometimes shows some aggression and jealousy. Once, for example, the child threw a heavy block into the baby's playpen.

Family 4. Physical contact and proximity seeking increase after the birth of the baby, and from time to time this occurs in a clinging and whining way. The father infrequently shows affection for the child. Before the birth of the baby, the child is not afraid of strangers, but just after the sibling's birth, he is troublesome when friends pay visits to the family. Two months after the baby's birth, the child reacts positively again to visitors, smiling and talking to them. The child is not afraid of the observer. Although common interactions between observer and child increase after the birth of the baby, the child does not interact frequently with the observer.

Before the birth of the baby the parents described the child positively. He liked to play with other children, was goodnatured and was active and delighted in exploring his environment. After the sibling's birth, the child is out of balance; developing sleeping problems, being moody and disturbed in the presence of visitors and seemingly resisting the mother. The mother is aware of this resistance. She feels insecure about the caregiving and guilty about the problems the child is facing because of the arrival of the baby. The child is attracted to the father, who wants to show that the child is as important as before the baby's birth. Before the delivery, he also felt very attached to and responsible for the child, but after the birth of the baby his share in the care of the child seems to increase somewhat. Neither before nor after the sibling's birth do parents and child interact frequently. Insofar as common interactions take place, they are characteristically very playful, although there is a decrease in playing after the baby's birth.

The parents display a permissive pedagogical style, but after the birth of the baby punishment is applied more strictly. The father in particular starts disciplining the child's behavior. In general, however, the pedagogical style remains permissive.

In the first weeks after the delivery the child interferes playfully with the interactions between parents and baby, but he does not often attract attention when the parents are busy with the baby. In the beginning, the child interacts with the baby in a loving way, sometimes caressing her and kissing her. Little by little the child transfers the blame for the existence of the baby from the mother to the baby. In the first months after the delivery, the child rejects the mother, but when the baby is about 4 months old, the child begins to direct aggression toward the baby. For example, he tries to jab her in the eyes, or tries to pull her through the bars of the playpen.

Family 5. Both before and after the birth of the sibling the child frequently seeks physical contact with and proximity to the parents. The child likes kissing her parents when playing. The father in his turn cuddles the child often, but she does not always appreciate these caresses. Only during play does the child react positively. The first month after the sibling's birth, the child clings to the father. After that month, however, physical contact seeking with the father ceases.

Before the birth of the baby, the child is sometimes afraid of visitors who pick her up. After the siblings's birth, this anxiety is no longer apparent. Neither before nor after the birth of the baby is the child afraid of the observer. The child frequently interacts with the observer and also seeks physical contact with and proximity to the observer. Compared to the other children, common interactions, in particular, take place very often.

Both parents are involved in the care of their children. The father feels he has to interact not only with the first-born child, but with the baby as well. Therefore, father and child do not interact more frequently after the delivery than before. The mother likes father's participation in the caregiving because it decreases her workload. However, the parents often comment upon each other's behavior toward the children. and they sometimes seem to be rivals in this respect.

The parents describe the child in positive words, before as well as after the sibling's arrival. The child is happy, easy-going and active. Toward the end of the observation period, the child becomes somewhat obstinate, but the parents do not really care, except for eating problems which provoke rather strong physical punishments. For example, the father forces the child to eat, pushing food into the child's mouth, and slapping her on the cheeks when she spits the food out.

Contrary to the other families, the parents do not demand more of the child's behavior after the birth of the baby. Their pedagogical style is less directive; toilet-training is finished before the sibling's birth, for example. Before as well as after the birth of the baby, the parents often interact with the child, but after the delivery the playful interactions almost disappear.

The parents did tell the child about the baby, although they doubt if the child really understood what was going on. After the birth of the sibling the child is not troubled very much. She tries to get the attention of the parents after they have taken care of the baby, needing to be cuddled then. To get the same attention, she sometimes imitates the baby as well. The interaction with the baby is ambivalent. Sometimes the child tries to understand the feelings of the baby, and casts about for explanations for her crying ("hunger"), and sometimes the child interacts in an unkind way. For example, child and observer are looking after the crying baby. The child makes a wry face at the observer and says: "Crying".

After some time she adds: "Puking, bah" (the baby has indeed brought up some milk). When the baby starts crying again, the child says: "Crying? Sleep!" (go to sleep!). She makes a wry face again and walks out of the room. Compared to the other children, the child frequently ignores the baby. For example, when the mother is feeding the baby, the child does not react at all, she keeps on playing.

Quality of attachment

Two months before and two months after the birth of the sibling, the firstborn child and both his parents were seen in a modified Strange Situation procedure. The results of this procedure are represented in Table 1.

Table 1
Quality of child's attachment to mother and father, before and after the birth of the sibling

Attachment[1]	Fam 1	Fam 2	Fam 3	Fam 4	Fam 5
- father before[2]	A	B	A	B	B
- father after	B	B	B4	B	A
- mother before	B	B	C	B	B
- mother after	B	B	C	A	B

Note. [1] A = anxious-avoidant B4 = anxious-dependent
B = secure C = anxious-resistant
[2] before = before the birth of the second child
after = after the birth of the second child

The measurements carried out two months after the delivery show a great deal of variance with the results four months earlier. In family 1, 4 and 5, shifts from A to B and vice versa can be observed. Only family 2 has a complete secure network, and family 3 a complete anxious network. The relationship with the mother appears to be more stable than with the father.

DISCUSSION

In the following, the results of the Strange Situation procedure combined with the profiles of the families are used to test the hypotheses of our study and to generate some new hypotheses.

Our first hypothesis, mentioned in the introduction, was: a network of secure attachments before the birth of a sibling will lead to a more adequate adjustment to the changed family system than a network with one or more anxious attachments.

From the analyses, we may conclude that a secure network is definitely no guarantee against the presence of envy toward the baby. Regardless of the quality of attachment, all children seem out of balance when having to share their parents with a sibling. Furthermore, almost all children take out their negative emotions on the sibling only after a few months. Prior to that time, the parents are their target. This is in agreement with the notion of Kreppner and his colleagues (1982) that the firstborn child feels the necessity to strike a profile as soon as the baby gets more active and manifests itself more clearly.

Thus, a secure relationship apparently does not provide the child with sufficient confidence to accommodate easily to the shock of the arrival of a sibling. Although vehement reactions are absent in families 2 and 5, in which a secure network existed before the delivery, this is also the case in family 3 with the anxious network. This anxiously attached child even interacts more tenderly with the baby than the other 4 children. We may conclude that even a trustful affective bond is severely tried by the birth of a baby, but we may also conclude that even an anxious attachment network is not necessarily an impediment to a relatively harmonious adjustment to the changed family system. Perhaps due to the absence of a secure bond with the parents (Dunn & Kendrick, 1982), the anxiously attached child compensates by interacting tenderly with the sibling. Or as Kreppner (pers. comm.) from a systemic viewpoint remarks: the anxiously attached child is in search of a partner in an isolated situation. A new sibling-subsystem has been established, enhancing the chance of finding a new equilibrium within the enlarged family system.

Our second hypothesis was: under certain conditions concerning the quality of the interactions, a more active role on the part of the father in childrearing is beneficial to the quality of the attachment of the firstborn child.

In the 5 families of our study, a relation between paternal participation in the care of the firstborn child and the development of attachment does exist. If the participation is more intensive, the quality of attachment improves. The father in family 1 participates actively after the birth of the second child. The anxious-avoidant relationship turns into a secure attachment. To a lesser extent, the same is true for family 3, if we accept the conclusion that B4-children have a better prognosis than the other anxiously attached children (see Van IJzendoorn et al., 1984). In family 4, the father participates more actively too, but the child is already securely attached to the father. In family 2, the father did participate intensively, not only after the birth of the baby but before as well. The child remains securely attached to his father. In family 5, both parents try to share the caregiving tasks for both children. The father does not invest more of his time in the care of the firstborn child. The child, who was securely attached before the sibling's arrival, has an anxious-avoidant attachment to the father after the birth of the baby.

In addition to these answers to hypotheses formulated prior to the data collection, our study generated the following new hypotheses:

1) A secure attachment is not a necessary and sufficient condition for a smooth pattern of family interactions. In family 2, the child is securely attached to his father and mother at both times of measurement, but the mother thinks the child is difficult to handle. To her mind, the child is moody, naughty and obstinate. After the birth of the sibling, the child develops sleeping problems and shows much protest behavior. The child in family 1 is perceived more or less in the same way. This child is securely attached to both parents after the arrival of the sibling. Nevertheless, the father perceives him as jealous, troublesome and moody. In contrast to these two securely attached children, the anxiously attached child from family 3 is characterized as calm, easygoing and obedient. The parents are satisfied with his behavior: he can amuse himself very well, he does not cry much, and is satisfied under all circumstances. The parents do not consider their bond with the child problematical. Perhaps the parents fail to notice the anxious attachment because they lack the sensitivity to perceive the emotional problems of their child. This same insensitivity may have caused or contributed to the development of an anxious relationship. With respect to the securely attached children we suggest that the existence of behavioral problems may be an indication of the resiliency of a secure network. The securely attached child knows it can work out its conflicts and problems without risking the secure relationship. These speculations have to be investigated in large-scale studies; the same holds for the finding that anxious attachments are not always considered problematical.

Characterizing a securely attached child as troublesome and an anxiously attached child as easy-going seems to be contradictory. However, the parental *perception of the bond* with the firstborn child agrees very well with the outcomes of the Strange Situation. The mother in family 1, for example, remarks that her child is strongly attracted to the father after the sibling's birth. Precisely in this case, the relationship between father and child improves from A to B. In family 3, the father thinks the firstborn child is more attracted to him after the delivery, and this is in agreement with the relative improvement of the quality of attachment from A to B4. In family 4, the parents think the firstborn child feels drawn to the father after the birth of the baby, while showing indifference to the mother. These perceptions correspond well with the change in attachment classifications: after the sibling's arrival, the child is securely attached to the father but anxiously attached to the mother.

2) A comparison of the attachment qualifications with the attachment behavior of the child at home results in the following hypothesis: it is not the frequency of physical contact and proximity seeking but the *nature* of such behavior that is of greatest importance. If a child shows attachment behavior in a positive way (for example, playing on a parent's lap) this seems to be an indication of a secure attachment relationship. If a child shows negative attachment behavior (for example, clinging to the legs of the mother, or crying when mother leaves the room), this may be an indication of an anxious attachment.

Before the birth of the sibling the child in family 1 seeks physical contact and proximity to the parents in a clinging and whining fashion. After the birth of the baby the child is securely attached to both parents, and clinging and whining decrease. The child in family 2, who is securely attached both before and after the birth of the baby, hardly ever shows clinging or whining behavior. When he seeks physical contact this happens in a positive way: talking with the parents while sitting on their lap. This pattern - whining and/or clinging in a period of anxious attachment - is also apparent in the behavior of the other three children.

3) From the analyses we may derive a hypothesis about the relationship between attachment and the amount of playful interactions in the family. The child is usually securely attached when parents and child play a lot. On the other hand, when parents and child play very little, the attachment relationship appears to be more anxious.

In family 1, playful interactions increase after the delivery, and in the same family the quality of attachment with the father improves considerably. In family 2, with the secure network, the parents play a lot during the whole observation period. In family 3, play occurs only rarely, and here the most insecure attachments exist. After the delivery, a slight increase in playful activities is mirrored by a slight improvement of the quality of attachment with the father. In families 4 and 5 the amount of play decreases after the sibling's birth, and this corresponds with a deterioration of the attachment quality; in family 4 with the mother, and in family 5 with the father.

Since frequent interacting and frequent talking do not seem decisive with respect to the quality of attachment, it is probably not sheer *quantity* of playful interactions that counts. The specific nature of playing, contrasting with other interactions, might be more important: only in playing is the child the center of interest. In other interactions adults rule the roost. Or it might be, as Volling (pers. comm.) suggests, that playful interactions arouse a more positive affect or a more pleasing social exchange which in turn foster secure attachment relationships. The crucial role of playful interactions for the development of attachment has also been mentioned by Dunn and Kendrick (1982), and by Lamb et al. (1982).

4) A last hypothesis concerns the correlation of pedagogical style with the quality of attachment. After the delivery, the pedagogical style in family 1 turns from permissive to directive. In this period the child has a better attachment relationship with the father. The directive style in family 5 changes to a mixture of a directive and a permissive approach. During this period, the child is anxiously attached to the father. The children from families 1 and 5, therefore, are both securely attached when their parents have a directive style, and are both anxiously attached to the father when the parents have a more or less permissive style. The permissive style in family 4 is mainly practiced by the mother, to whom the child is anxiously attached after the delivery. The father, to whom the child is securely attached, has a more directive approach; he tries to regulate the child's behavior more strictly. Of course, a directive style is not a sufficient condition for a secure attachment, for in family 3 a directive style dominates, and in this same family there is an anxious network. Perhaps only the combination of playful interactions and a directive style is such a condition.

Furthermore, one should not simply assume a causal relation between the birth of a sibling and a change in pedagogical style. It might be that parents make higher demands upon the growing child, irrespective of the arrival of a sibling. Generally, parents have higher expectations of their child with respect to discipline and self-reliance after the first year (Kreppner, pers. comm.).

CONCLUSIONS

In a qualitative study, five families were observed weekly during the three months before the birth of a second child, and for about five months after the arrival of the sibling. Using participant observation and semi-structured interviews, the behaviors, the intentions and feelings of the subjects were described. Through systematic content analysis, based upon the work of Spradley, profiles of family interactions were constructed. The quality of the firstborn child's attachment with his father and mother was measured in a modified Strange Situation, two months before and after the delivery.

The results show that all children have problems with the arrival of a sibling, expressing it, for example, by aggressive reactions to the intruder. A secure network does not guarantee a smooth adjustment to a tetradic family system. The most harmonious sibling relationship exists between an anxiously attached child and his little sister. Generally, a secure network does not exclude behavioral problems; on the other hand, anxious attachments are not necessarily perceived by the parents as a pedagogical problem. Yet parents are capable of perceiving changes in attachment, as measured in the Strange Situation, in their daily life.

The results also show that an intensive participation of the father in family life can be compatible with an improvement of the quality of the firstborn's attachments. This quality seems to be determined, among other things, by the frequency of playful interactions; the frequency of other interactions seems to matter less. Pedagogical measures do not show much correspondence with the quality of the attachment network. A permissive style certainly does not guarantee the development of secure attachments; however, a directive style does not seem to be decisive either. The results show that strict rules and the consequent stimulation of behavioral and cognitive competence do not exclude an improvement of the attachment quality.

THREE YEARS LATER

Introduction

Three years after the birth of the second child, the five children and their parents participated in a follow-up study. The most important question of this follow up study was: what effects do the different attachment relationships have on the functioning of the children when they are about five years old.

To answer this question, we firstly investigated the socio-emotional adjustment of the children. This adjustment is expressed in the degree of ego-resiliency and ego-control. Block and Block (1980) define ego-resiliency as "the resourceful adaptation to changing circumstances and environmental contingencies" and ego-control as "the threshold or operating characteristic of an individual with regard to the expression or containment of impulses, feelings and desires". Securely attached children are assumed to make a better socio-emotional adjustment (i.e., a high degree of ego-resiliency and a moderate ego-control) than anxiously attached children at the age of 5 (see chapter 5, this volume).

Secondly, the quality of the interactions between mother and child, and father and child during problem-solving has been investigated. The affective and cognitive "tuning in" of the parent to the child was determined by making parents and child perform a few tasks. We assume that interactions within a secure attachment network run more smoothly than in an anxiously attachment network (see chapter 5, this volume).

Thirdly, the children were tested with respect to their cognitive development. The assumption is that the cognition of securely attached children is on a higher level than that of anxiously attached children.

Fourthly, we had an interview with each mother about the past 3 years, discussing the reactions of the eldest child to the sibling as well as other important events.

Methods and procedure

To determine the ego-resiliency and ego-control of the children, a Q-sort was used: the Nijmegen California Kinder Sorteertechniek (Van Lieshout et al., 1982). Both parents and nursery school teacher sorted the 100 personality- relevant items in order to provide a picture of the child. These judgments were correlated with two ideal-type cases, derived from the research of Block and Block: a profile of a child with a high ego-resilience, and a profile of a child with a weak ego-control. The correlation coefficient is the score on resiliency and control, and takes on values between -1.00 and +1.00. These scores were then compared with the means of the subjects of the study described in chapter 5 of this volume Thus, the subjects of that study serve as a standard for the description of the 5 children.

In order to determine the quality of the interactions, mother and child performed 4 tasks:

a) copying a Duplo-construction from a photograph (Duplo)

b) ranking 5 pictures in a logical story (Logic)
c) stacking 10 little tubs in order to get 1 tub (Butterdish)
d) putting together 9 corrugated blocks in order to get 1 big rectangular block (Wiggly)

Father and child performed 3 tasks:

a) copying a mosaic (Mosaic)
b) putting abstract figures in the right places in a framework (Inlay)
c) putting pawns of different size in the right places in a standard (Pawns).

The parents were instructed to help the child as they are accustomed to. The activities during problem-solving were registered on video. Observation scales (mostly 7-point scales) were developed to measure the contribution of the parent to the affective climate, the instruction behavior of the parent, the interaction between parent and child and the competence of the child.

The interrater agreement with respect to the mother-child interaction was good (for Duplo $\bar{r}$=.83; Logic $\bar{r}$=.82; Butterdish $\bar{r}$=.84; Wiggly, $\bar{r}$=.85). Because the same scales (as for Duplo, Logic and Butterdish) were used for measuring the father-child interaction, and the same rater as well, determination of the interrater agreement with respect to the tasks performed by father and child, was deemed unnecessary.

In a next step, the scales were summarized with the help of factor analysis (see chapter 5, this volume).

To determine the level of the cognitive development of the children, 5 subtests of the "Leiden Diagnostic Test" were used. The selection consisted of: "Block design", "Word span", "Picture indication", "Repeating sentences", "Comprehension". This combination covers the greatest range of functions with the least number of tests, and can also be used as a foundation for the calculation of IQ. We used the LDT manual to score the answers of the children (Schroots & Van Alphen de Veer, 1976).

Apart from determining the IQ of the children in this manner, the tests were registered on video with the purpose of judging the behavior of the children toward the experimenter and the test situation. Thus, the LDT was not only used to determine the cognitive competence of the children, but also as a means to describe the behavior of the children in a stressful situation. Rating scales were constructed to measure if the child was at ease, the degree of obedience, interaction with the experimenter, self-reliance, pleasure/energy, reaction to failure and concentration. Two raters independently scored the tape of one of the 5 children. The interrater agreement was good: 82%. With the aid of these scales, qualitative descriptions of the 5 children were constructed (Lambermon, 1986).

Results

In the following, the results of the follow up study will be reported upon within a description of each of the 5 families. In table 2 the numerical results of the different methods will be presented.

Family 1. The composition of the family has remained unchanged: father, mother, and two children. Meanwhile, the mother has got a job for 24 hours a week as a laboratory worker. She did not aspire to working outside the home; the job was simply offered to her. As an advantage of working outside the home the mother mentions "being away from the house", but as a disadvantage she mentions "a feeling of constraint". Just as three years before the mother does not seem satisfied with the current state of affairs. The elder child, who was about 2½ years old when the mother became employed, had to get accustomed to the baby-sitter. He was troublesome when the mother left the home, but after some time separation was easier. Furthermore, the mother remarks during the interview that the elder child likes his little sister. They play together a lot, although there is rivalry between them too.

One of the most striking results of the follow up study concerns the low intelligence of the eldest child, as measured with the LDT. During the qualitative study three years ago the mother already thought to perceive a slow development of the child. She thought the child spoke badly, and therefore she tried to stimulate his speech. Regularly, the child had to point out and mention the names of animals depicted on a placemat. This idea of the mother concerning a slow cognitive development is mirrored in the low scores on all subtests of the LDT.

During the test, the child is curious and cheerful. He enjoys the activities and does his best. In the beginning of the test he is a bit uncertain and tense, but in the course of the test his self-reliance increases: he is satisfied with his performance, admits mistakes in a laconic way. When he fails, because the tasks are too difficult, he seeks the support of the experimenter, who motivates him again. His concentration is not optimal, sometimes he is distracted. However, this distractedness, caused by a playful and curious attitude, does not seem to be detrimental to the test results.

The tasks performed by parent and child show that both father and mother give the child many instructions. As the tasks become more difficult (Butterdish and Wiggly) the mother

Table 2

Display of attachment classifications at the age of 2; ego-resiliency and ego-control, IQ according to the LDT, and parental instruction behavior at the age of 5

		Fam 1	Fam 2	Fam 3	Fam 4	Fam 5	Standard-group (*n*=65)
Attachment	M before[1]	B	B	C	B	B	
	M after	B	B	C	A	B	
	F before	A	B	A	B	B	
	F after	B	B	B4	B	A	
Ego-resiliency	Parents	.41	.63	.58	.73[2]	.42	.49
	Teacher	.79	.68	.43	.66	-.50	.46
Ego-control	Parents	-.15	.11	-.19	.16[2]	-.16	.12
	Teacher	-.16	-.21	-.19	-.11	-.29	.01
Agreement	Mother-Father	.55	.71	.57		.45	.54
	Mother-Teacher	.67	.54	.54		.20	.42
	Father-Teacher	.46	.42	.61	.55	.00	.41
IQ according to LDT		*78*	*123*	*108*	*127*	*102*	*111*
Instruction mother:							
affective climate		9	17	21	21	10	
Wiggly climate		14	13	17	17	7	
instruction	Duplo	11	8	18	12	11	
	Logic	12	8	15	8	14	
	Butterdish	13	7	10	7	12	
concrete actions Butterdish		9	7	9	9	9	
instruction Wiggly		15	13	17	14	8	
Instruction father:							
affective climate		5	13	9	4	10	
instruction	Mosaic	16	14	21	17	14	
	Inlay	11	7	8	4	8	
	Pawns	16	20	15	12	17	

Note. [1] M = mother; before = before birth of second child
F = father; after = two months after birth of second child
[2] Resiliency and control as perceived by the father (the Q-sort of the mother was received too late)

gives the child more instructions. The fact that the child also receives many instructions when performing easy tasks could be connected with the low intelligence of the child. Generally, neither the father nor the mother create a "warm" atmosphere, with the important exception of the most difficult task.

The ego-resiliency of the child is, in the opinion of the parents, lower than the mean of the standard group. The nursery school teacher, however, notices a high degree of ego-resiliency. Parents and teacher are in agreement as to ego-control: control is lower than the mean of the standard group, meaning that the child's ego-control is too strong.

Family 2. The family still consists of 4 members: father, mother and the two children. During the interview, the mother relates that a half year of observation was too short, for the "trouble began" when the baby was about 6 months old. The baby did not like sitting in the playpen, and therefore was "all about the place" when she was very young. The elder child did not like the baby moving around in the room, he would try to sit down on her, for example. However, this period of "trouble" did not last long. Now the children are on good terms with each other, often playing in a nice way. Sometimes they quarrel, "but it's all in a day's work", as the mother says.

The results of the cognitive test show a high intelligence. In the beginning of the test the child is inhibited, but subsequently he relaxes (laughing, joking). The child seems to have a considerable dose of self-reliance. He does not need much support; only when the block designs are difficult does he seek support. He does his best, and after the first subtest he also enjoys the activities. Furthermore, the child is pliable and obedient. In the course of the test he becomes tired and his concentration decreases.

The tasks performed by parent and child show that the mother gives few instructions, whereas the father gives a moderate number of instructions. The most difficult task (Wiggly) draws a large number of instructions from the mother. She adjusts the intructions to the level of difficulty of the tasks. The mother creates a moderately warm atmosphere when the child performs the tasks. The father creates a climate full of warmth.

Both parents and nursery school teacher think the child has a high ego-resilience. The opinions concerning ego-control differ, however: in the opinion of the parents, the degree of ego-control agrees with that of the standard group, whereas the teacher notes a strong control. The threshold of the containment of impulses, feelings, and desires seems to be higher at school than at home.

Family 3. In the meantime the family has been expanded to 5 members; another baby was born two years ago. It was planned that the eldest child and his little sister should stay with family for a week when the mother had the third child. However, the eldest child held out only for two days. During those two days he did not want to eat or drink so the father fetched the child. The mother thinks that the child's reaction had been caused by a former separation. Three years ago, the family moved to their new home. During the removal, the mother left both children with the grandparents, where the children were to stay for a week. The mother did not say goodbye to the eldest child when she left the grandparents, expecting the child to cry if she did. Afterwards the grandmother related that the child repeatedly asked for his mother. The grandmother would then show the child a photograph of the mother, regularly saying "Mummy will come and fetch you". After this stay every time he had to sleep elsewhere, the child asked his mother: "You will stay here mummy, you won't go away, will you?" Also when the child is allowed to have dinner elsewhere, he still asks: "But I'll come back to sleep here, won't I mummy?" The mother says: "That first experience stuck, and he could not even talk then!"

Until the moment the baby was beginning to be mobile the eldest child was fond of his sister, but he did not like her crawling and her manipulating his toys. He snatched everything away from her, but his sister took everything away once again. The eldest child was very surprised by this behavior, but he never reacted aggressively toward his protesting sister. Once the eldest child had accepted that all things also belonged to his sister, the boy and the girl were just like twins: they did everything together and they still play together a lot.

The mother relates that the eldest child has always been easy-going. A moment later she says: "Actually: one *thinks* sometimes he is easy-going, but he falls short of one's expectations now and then". When his little sister had her birthday, many children came to the party, organized by the parents. A few months later the eldest child said to the neighbor: "My little sister had her birthday and there were a lot of children; when *I* had my birthday there weren't any children". Mother thought this a sad story when she heard it. The eldest child had never said this to his parents, but he did to the neighbor. Mother: "Yes, and you think he's easy, and yet that stuck in his mind".

According to the LDT, the child has a moderate intelligence. During the test he is inhibited, in the beginning somewhat more than in the subseqent subtests. This inhibition is expressed by soft muttering, sometimes his hands in front of his mouth, a tense facial expression and little eye contact. During some subtests he seeks support with a very uncertain attitude; however, he tends to take the support as criticism. At the outset he makes an uncertain impression, later on he gets more self-reliant. He does not enjoy the activities, sometimes showing resistance to the tasks; he asks, for example, if he is allowed to do something else. He does his best, with the exception of "block designs". In the course of the test his concentration decreases.

The tasks performed by parents and child show that the mother creates a very warm atmosphere (she smiles often, she does not hold back at all), whereas the father creates a moderately warm atmosphere. Both parents, but especially the mother, give many instructions. Notable is that the mother also gives many instructions when the child performs easy tasks (Duplo and Logic).

In the opinion of the parents, the child's ego-resiliency is higher than the mean of the standard group, whereas the nursery school teacher judges the resiliency somewhat lower than the mean. The parents and teacher are in agreement as regards ego-control: the child has a strong ego-control.

Family 4. In the meantime, the family has been expanded to 5 members; a year ago another baby was born. With respect to the period after the qualitative observations, the mother relates that the eldest child was annoying to the second child when the latter was about 1½ years old. When his little sister was playing, the eldest child would upset her playing. He would then not play with her, but sat down elsewhere and was bored. He once more interfered when his sister found something new to play with. This happened in the period preceding nursery school. The mother relates that the eldest child was horribly bored before he went to school, and he was in a bad temper. Once at school, these troubles ended. Now the eldest often plays with his sister, but they quarrel about little things too. Furthermore, the mother relates that the eldest child looks sulky and kicks at the mother when he sees her again after the parents have been away for a night, and the child has been under the care of a babysitter.

According to the LDT, the child has a high intelligence, the highest IQ of the 5 children in the study. During the test he is not inhibited. Sometimes he is frank, which goes together with provocative behavior, trying to take control. He creates a self-confident impression. He does his best and his concentration is good. During "block designs", he shows resistance to the task; for example, by walking away from the table, or by making designs which he wants the experimenter to copy. Here he tries to invert the authority relationship. During the other subtests, the child is more pliable and obedient. Only in performing "block designs", does the child seek support, but at the same time he has difficulty in accepting that support (and criticism). The child does not enjoy the activities; he is pent-up in his manner.

The tasks performed by parent and child show that the mother gives a moderate number of instructions. Notable is that she gives many instructions when the child performs the easiest task (Duplo). The father gives few instructions. Another difference between father and mother is that the mother creates a very warm affectionate climate, the father not at all.

Both father and nursery school teacher consider the ego-resiliency of the child high (unfortunately, the Q-sort of the mother was received too late). In the opinion of the father, ego-control is near the mean of the standard group, whereas the teacher notes a strong ego-control. The threshold of the containment of impulses, feelings and desires seems to be higher at school than at home.

Family 5. The family still consists of 4 members: father, mother and the two children. During the interview the mother relates that the eldest child began to get jealous when the baby was able to crawl about. The eldest child then tried to put the baby back in the play-pen, or in bed. In the beginning, the eldest child did not like the mobility of the baby. She soon got accustomed to it, however, and accepted this new situation rapidly. Now both children play a lot with each other. The eldest child likes playing "nursery school teacher", imitating school situations, in which her little sister is pushed into the role of "child". Also, during the visit to the university, the child puts her father, mother and the two investigators in a circle, and tries to lead a conversation (just as at school).

According to the LDT the child has a moderate intelligence. Just before the test starts, the father says to the child that she has to do her utmost. This might be the reason that the child is inhibited at the beginning of the tests. Later on she is more relaxed, making spontaneous remarks and jokes. The child is a good girl, doing what the experimenter requests. However, she tries to withdraw from "block designs". She has difficulty in accepting her failure and the criticism of her mistakes when performing this subtest, although she is motivated by support. As soon as she reaches her limits, she does not ask for help, but for permission to stop the subtest. Self-reliance varies with the subtests. The child is uncertain and tense in performing the first two subtests, but more self-confident during the last two tasks. Apart from "block designs", she does her best and her concentration is good. She enjoys only the first subtest, disliking the other tasks. As soon as the child thinks the tasks difficult, she loses courage and gets moody.

The tasks performed by parents and child show that the mother, as well as the father, give a moderate amount of instructions. Notable is that the mother gives few instructions when the child has to perform the most difficult task. The mother is not sufficiently skilful to solve the Wiggly-problem, and the child stops trying. The father creates a warm atmosphere during the performance, the mother not at all.

In the opinion of the parents, the ego-resiliency of the child is somewhat below the mean of the standard group. Striking is the judgment of the nursery school teacher: she notes a very low ego-resiliency. The parents notice a strong ego-control, the teacher to an even greater extent.

Conclusion

All 5 children had difficulty with the mobility of the baby. From the stories told by the mothers, child 2 (the completely securely attached child) seems to have reacted most aggressively to this mobility, and child 3 (the completely anxiously attached child) the least. The conclusion of three years ago, that a secure attachment network is not a guarantee for a smooth adjustment to changing family situations (whereas in an anxious attachment network such adjustments may take place in a smooth way) seems also applicable over a longer period of time.

In spite of differences between the 5 children, the *parents* think their children resilient. However, the nursery school teachers of children 1, 3 and especially 5 do not agree with the parents. According to the teacher, child 1 has a high ego-resiliency, whereas the teacher of child 3 rates the child's resiliency much lower than the parents. The most striking deviation concerns child 5: according to the teacher, the child has a very low ego-resiliency (she shows ego-brittleness). Child 5 deviates strongly from the other 4 children in this respect. Child 5's imitation of the teacher and school situations in her play at home probably serves as a means of working out problems at school.

With respect to ego-control, all children show (too) strong control at school. In the opinion of the *parents*, however, the degree of ego-control of child 2 agrees with that of the standard group. This is also the case in the eyes of father 4 The other 3 children show a strong ego-control not only at school but at home as well.

The judgments of the 10 parents differ remarkably in one respect: the parents of the securely attached child 2 have a much higher consensus in their perception of their child than the other parents. The judgments of parents 5 show the least consensus, and neither parent agrees with the judgment of the teacher. With respect to the socio-emotional adjustment, child 2 from the secure attachment network appears, as expected, to have made the best adjustment. This child has an optimal ego-resiliency and ego-control in the opinion of the parents, although this control is too strong at school.

The intelligence of the securely attached child 2 is high, and that of the anxiously attached child 3 is moderate. Striking is the low intelligence of child 1, which at the same time, however, confirms the supposition of slow development remarked by the mother three years earlier. The efforts of the parents to stimulate the language development of the child at that time are mirrored in the many instructions they give the child during problem solving three years later. The securely attached child 2, and child 4 from the mixed attachment network, who both have a high intelligence, receive few instructions. Child 5 with a moderate intelligence receives a moderate number of instructions. Therefore, it is striking that child 3, who has a moderate intelligence, gets so many instructions, especially from the mother, not only during the performance of difficult tasks but also during the easy ones. The mother gives the child little opportunity to show his competence. The father is apt to behave similarly, but to a lesser degree. Also striking, however, is the positive climate created by the mother when the child performs the tasks. Mother 4, to whom the child is anxiously attached after the birth of the second child, creates a warm atmosphere too. The mothers 1, 2 and 5, to whom the children are securely attached, are more reserved. Mother 5 even holds back, which seems to be related to the sex of the child (child 5 is a girl). In the standard group, the atmosphere between mothers and daughters was also worse than the climate between mothers and sons. The atmosphere created by the 5 fathers during the performance of the tasks is in agreement with the degree of affection shown three years earlier. At that time, fathers 2 and 5 showed more affection than the other fathers, just as three years later.

Comparing the secure attachment network (family 2) to the anxious attachment network (family 3), the adjustment of the anxiously attached child to the changing family system seems, also over a longer period of time, more adequate than the adjustment of the securely attached child.

On the level of the socio-emotional adjustment, the securely attached child has an advantage over the anxiously attached child: the degree of ego-resiliency and ego-control of child 2 is more optimal, although he - just as child 3 - shows too strong an ego-control at school. Another advantage concerns the cognitive level: the intelligence of child 2 is higher than that of child 3, which of course does not mean that type of attachment relationship results in a particular IQ. In a large-scale study on the relation between attachment and intelligence, the securely attached children did show the highest intelligence; however, the C-children performed very well on the intelligence test too (see Van IJzendoorn & Van Vliet, 1986).

Furthermore, the securely attached child shows more self-reliance during the performance of the subtests of the LDT, and he also enjoys doing these tasks much more than the anxiously attached child. Child 3 is uncertain, shows less self-reliance, and does not enjoy performing the tasks. The quality of the interactions within the secure attachment network during problem-solving is positively distinguished from the quality of the interactions within the anxious attachment network: the parents of child 2 give less instructions to the child than the parents of the anxiously attached child 3. The difference between mother 2 and mother 3 is particularly clear: mother 2 gives her child much more opportunity to find the solution than mother 3. Nevertheless, it is peculiar that mother 3 creates a "warmer" atmosphere during the performance of these tasks than mother 2.

Three years earlier, the parents of child 3 did not notice any problems in their attachment relationship with the child: they thought him obedient, easy-going and calm. At that time, we mentioned a lack of sensitivity to perceive the emotional problems of their child as a possible explanation. Three years later, the mother is aware of this insensitivity when she corrects herself by saying: "You think sometimes he is easy-going, but that isn't always the case". In the meantime the mother has experienced that much more is going on in the child than he expresses. For a long time the mother considered the child's awareness as being equal to his verbal competence, implying that the child would be impressed by events only from the moment he was able to talk. This misunderstanding and the several separations the child went through, seem to have contributed to the further development of the anxious attachments.

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CHAPTER 8

INTERACTIONS IN THE FAMILY, ATTACHMENT AND THE BIRTH OF A SIBLING: A QUANTITATIVE APPROACH

Maria M. Vergeer

ABSTRACT

Interactions of parents and firstborn child were observed weekly during supper in five families for several months before and after the birth of a sibling. Changes appear to take place in the total frequency of interaction, in the participation of father and mother and - to a lesser extent - in sequences and content of parent and child behavior. In some families the role of the father becomes more important, in other families the role of the mother. Changes in the interactions in the period of six weeks after family extension seem to be accompanied by changes in the quality of the attachment relationship between child and parents. In most families the changes observed were only of a temporary nature.

INTRODUCTION

The birth of a sibling can have important consequences for both parents and firstborn child. In the period immediately following childbirth, the mother is available to the child to a lesser extent than before - whether the mother gives birth in the hospital or at home. For the child this particular period of time is usually associated with extensive contact with other caretakers: either the father, the maternity nurse, or relatives look after the firstborn. But also in the long run changes are to be expected in the caregiving arrangements for the firstborn child. After the arrival of the second child, the parents face the task of dividing the time origin-

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ally available for one child between two children. It can be expected that especially the father feels a demand for more involvement in family life (Lamb, 1978; Kreppner, Paulsen, & Schuetze, 1982).

Various investigations report about changes in the interactions between mother and firstborn child after family extension. Mothers and children are observed to show less warmth and increased emotional neutrality. Mother and child appear to be less attuned to one another with respect to the contingency of their behaviors (Taylor & Kogan, 1973). Dunn and Kendrick (1980) describe a decrease in maternal attention and play, increases in negative confrontations and changes in the balance of responsibility for initiating interaction: after the birth of the sibling, the child initiates more and the mother less interaction in most families. When compared to families with only one child, the mother-firstborn dyad is characterized by less play and more upset, proximal and dependency types of behavior (Feiring & Lewis, 1984). The previous studies indicate that family extension can have a great number of consequences for the affective relationship between mother and child.

When the expectation of more active participation of the father in family life after the birth of a second child is borne out, we can also expect changes in father-child interaction. Pedersen, Yarrow, Anderson and Cain (1979) report in this connection that in families with a caesarean delivered baby, fathers took on much of the caregiving responsibilities for the children. When the infants were five months old, the fathers appeared to be more responsive to fussing and crying than fathers with naturally delivered babies, and more responsive than the mothers.

In this study, we wish to investigate the influence of the birth of a second child on the participation of father and mother in caregiving and rearing of the firstborn child, on the interactions between firstborn child and both parents, and on the attachment relationships of the firstborn child with both parents. Data were gathered in a relatively intensive way, by observing families for several months before and after family extension. In this chapter, we shall restrict our attention to the influence of the birth of a sibling on the interactions between child and parents during supper, and on the quality of the attachment relationships.

Based on the research described previously, we derive the following expectations. After family extension we expect the mother to participate less in interaction during supper, and to be less responsive to the signals of the child. The child, in its turn, will react less to interactions of the mother. The father is expected to have more interactions with the child during supper and to be more responsive to the child, and the child will react more often to these father initiated interactions. The results concerning interaction during supper will be related to changes in the quality of the attachment relationship between firstborn child and both parents. This quality - secure or insecure - is determined to a large degree by previous interactions between parents and child (Ainsworth, Blehar, Waters, & Wall, 1978). The changes expected in the interaction between mother and child may be associated with changes from secure to insecure attachments. If the father succeeds in compensating for the decrease of attention of the mother, insecure relationships with the father might change in a secure direction.

METHODS

In the first section, a description of the participating families is given. We shall then describe the research design, the procedure and contents of observations, the data reduction and the reliability of the observations, followed by the assessment of the quality of the attachments. Finally, some attention is given to the way the data were analyzed.

Subjects

The five families participating in this study were selected through the help of midwives and a maternity center. At the beginning of the study, the children were between 71 and 99 weeks old. There were four boys and one girl. The occupational level of the fathers was classified on a scale extending from unskilled labor (1) to academic level (6) (Van Westerlaak. Kropman, & Collaris, 1975).

Table 1
Description of the families

	Age in weeks at start of study	Age in weeks when sibling is born	Sex of first-born child	Sex of sib-ling	Father em-ployed	Occupa-tional level of father
Family 1	71	84	male	female	yes	3
Family 2	99	111	male	female	yes	5
Family 3	59	71	male	female	yes	5
Family 4	73	84	male	female	no	5
Family 5	94	106	female	female	yes	1

In one family, the father is not employed. This family can be described as role-sharing with respect to childcare. In the other families, tasks are divided rather traditionally. However, three fathers appear to be at home more often than the fourth father. One of these fathers works shifts. In addition, he did not work during the six weeks prior to family extension because of a strike. In another family, the father stays home regularly because of school holidays. The third father stayed home on sick-leave seven weeks preceding and six weeks following family extension. In the analyses, these kinds of differences within and between families are taken into account.

Procedures

Design. The research design we used is called a time-series. In this kind of study, a group or an individual is observed regularly and an experimental change is introduced during the series of observations. The results of the intervention are demonstrated by changes in the dependent variables (Campbell & Stanley, 1966). In this investigation, the intervention consists of the birth of a sibling.

Observation procedures. Every family was observed at home weekly, normally on the same day of the week. For various reasons, 16 observations did not take place, five in families 1 and 4, two in the other families. None of the families were observed in the week of childbirth; in two families this resulted in two missing observations. The other observations did not take place because of a holiday, business trips or the illness of either the observer or the child. In addition, the data of 11 observations were lost because of mechanical failure. The observational period resulted in data from 155 suppers. Although we tried to collect data up to six months after delivery, this was not possible in all families. Thus, the number of observations differs between families (see Table 2).

The families were observed during supper. During this period, data were collected for a qualitative study by means of participant observation. The results are described in chapter 7. In addition, child and parent behavior during supper was recorded in precoded categories. The present chapter concerns the latter part of the study.

Behaviors observed during supper. The categories of behavior were selected from investigations into the behavior of fathers with children (Pedersen & Robson, 1969; Rendina & Dicker-

Table 2
Number of observations for each family

	1 week 45
Family 2	000000*0000-I0000*000000000*0**0000000000
Family 1	000*0000000-I0-00*00000-000-000
Family 3	00000000000*I00000000000000000000-00000000
Family 4	000000*0*00I00000000*00--0-00000000-0000
Family 5	0000000000000I0000000000-000

0: observation
I: intervention family extension
-: missing observation
*: data lost because of mechanical failure

scheid, 1976), differences in behavior between fathers and mothers (Lamb, 1977; Weinraub & Frankel, 1977; Clarke-Stewart, 1978; Belsky, 1979), and behavior of children towards parents (Lamb, 1976; Lamb, 1977; Clarke-Stewart, 1978; Belsky, 1979). Different kinds of behavior were scored: interactive behaviors like playing, vocalizing or attention; more emphatic behavior like stimulating and correcting by parents, and negative behavior or complying by the child; and some meal-specific behaviors like caregiving for the parents and motor (usually eating) behavior for the child. Attachment behaviors were also scored - to be distinguished here from behaviors emitted at low intensity of activation of the attachment system like smiling and vocalizing. These latter kinds of behavior are not specific for attachment figures (Ainsworth et al., 1978) and were scored in other categories. Affectionate behavior of parents was also scored. Some distinctions were made within the categories, but as only global categories are discussed in this chapter, they shall not be dealt with here. Because sequences of behavior are also analyzed, the coding system has to be complete, which means that some codable event must occur at every instant of observation. For this purpose, an extra category is usually included to score the absence of other codable behaviors (Sackett, 1979). For parent behavior we included a subcategory "other non-verbal behavior". This category is not interpreted in the analyses of content of behavior. For the child an extra category was not necessary because all non-verbal behavior could be scored in the category "motor behavior". Mutual exclusivity of behaviors - another assumption for sequential analyses - was attained by specifying rules for the priority of coding of behaviors

(Sackett, 1979). Data were collected using an event recorder.

Data reduction. After data collection, choices have to be made concerning clustering of categories and type of analysis: time or event sequences (Martin, Maccoby, Baran, & Jacklin, 1981). As described before, only main categories were analyzed. The parent towards whom the child directs behavior is not distinguished in some analyses. Behavior by both parents at the same time did not occur often, and was thus scored together in a global category "both parents did something". The categories included in the analysis are shown in Table 3.

Table 3
Behaviors of child and parents

Directed to child by mother	Directed to child by father	Directed to mother, father or no one in particular by child	Both parents behave at the same time
affection	affection	attachment	every behavior
play	play	play	
stimulation	stimulation	compliance	
caregiving	caregiving		
vocalization	vocalization	vocalization	
attention	attention	attention	
other nonverbal	other nonverbal	motor behavior	
correction	correction	negative behavior	

Despite the fact that in collecting the data the duration of behavior was automatically recorded, the data are analyzed on an event-basis. It is not unusual to transform data from one type to another during analysis (Bakeman, 1978). As shown in Table 2 data were not collected every week for all families. Missing observations are problematic when comparing results within and between families. Also suppertime coincidences like attractiveness of food and, say, consternation over a lost purse cause variability. To reduce these kinds of differences and to enable comparisons of different periods, observations were clustered for periods of six weeks. In this way every period consists of at least three observations.

Reliability. To assess the reliability of the observation system, every observer scored three suppers at different times during the data collection phase. Two suppers were scored from a videotape and one supper at home on different evenings for each pair of observers. In addition, one tape was scored twice by each observer, with an interval of one week, to determine intra-coder-reliability. Reliabilities were computed for total frequencies and for observer and coder-agreement. None of the tests of homogeneity of distributions (χ^2) were significant, so there are no indications of differences in distributions for different observers, or for distributions of the same observers at different scorings. The quality of the observational process was determined by dividing the number of agreements by the sum of the number of agreements and half of the behaviors scored by one observer, but not by the other observer (the formula is Lytton's, described by Leenders, 1984). Between observers the percentages varied from 61.7% to 72.9%, within observers from 76.4% to 81.4%. Considering the complexity of behaviors the observers have to choose from, these figures seem reasonable. The point-for-point agreements for coding were computed by Cohen's kappa. The inter-coder-agreement ranged from .75 to .87, the intra-coder agreement from .91 to .95. Kappa's for persons toward whom the child directs behavior were between .82 and .95 for inter-coder and between .94 and .97 for intra-coder-agreement.

Quality of the attachment relationships. Besides the observation of suppers at home, all families were observed twice in a laboratory playroom in order to assess the quality of the attachments to both parents. In a modification of the Strange Situation procedure (Lamb, 1976), the child is exposed to a series of separations from and reunions with the father and mother. Every episode lasts three minutes. In the first episode father, mother and child are together in the playroom. At the beginning of the next episode the father leaves the room, returning in the third episode. After three minutes, the mother leaves, returning in the fifth episode. In the sixth episode both parents leave the child and return together in the last episode. In this procedure, differences and similarities in attachment behavior towards both parents may be revealed better than in the traditional Strange Situation (Ainsworth et al., 1978; Vergeer, 1986). The behaviors of parents and child were videotaped and coded afterwards, following the methods described by Ainsworth et al. The child's behavior is scored on rating scales. In the reunion episodes these are "proximity and contact seeking", "contact-maintaining", "avoidance", and "resistance". In the separation episodes the rating scale is for "searching". Two discrete behaviors were also scored, namely, "crying" and "exploratory manipulation". In addition, the affective behavior of the child before separation is also scored on a rating scale (Waters, Wippman, & Sroufe, 1979). From this information the quality of the attachment relationships is assessed. Securely attached children (B) want proximity and contact with the parent in the reunion episodes, and show little or no tendency at that time to resist or avoid the parent. When the parent returns, they are readily assured by the parent and are able to return to play. Children with an anxious-avoidant relationship (A) do not seek interaction with the parent, and show strong avoidance during reunions, for example, by looking away when the parent returns. Children with an anxious-resistant relationship (C) show ambivalent behavior. They seek proximity and contact, but resist it as well. Anxious-dependently attached children (B4) show a mixture of secure and resistant behavior. The intercoder-agreement appeared to be satisfactory. For the most important behaviors - the rating scales for interactive behavior - the Pearson correlation coefficients ranged between .82 and .99. The agreement about the quality of attachment relationships was 100%.

Analysis. Because we have only global expectations about the effects of family extension, descriptive techniques were used for analysis. In addition, in some families other changes in family circumstances took place that might also lead to an increase in participation of the father. Also the opportunities for fathers to participate in childcare immediately after family extension were not the same in every case. The exploratory nature of this study, and the limited number of observations - even when not clustered into six-week-periods - led to the decision to use descriptive techniques. For each family, changes in dependent variables were investigated in relation to family extension and other changes in family circumstances. If there is a relationship between the frequency of a dependent variable and a specific observation period, the observed frequency deviates from the expected frequency. The extent of deviation between observed and expected frequencies is indicated by the height of the standardized residual. To avoid stressing chance fluctuations too much, only cells with a residual higher than ±2.58 are discussed, which corresponds to a significance level of 1%. This is a rather strict criterion considering the exploratory character of the study, but the high number of scores would otherwise lead to significant residuals even when small fluctuations occur.

RESULTS AND DISCUSSION

The results of this study are presented in several sections. First, the independent variable "family extension" is described. The most important question to be answered is how much the father participates in childcare in the period immediately after the birth of the second child.

Subsequently we shall describe the quality of the attachment relationships of the child to both parents, six weeks before and after family extension.

The last section concerns the observation of the interaction between parents and child during supper. We will discuss the number of interactions, the participation of the child and both parents, the responsiveness of parents towards the child, the reactions of the child to interactions of the parents and the content of behavior of the child and the parents.

Arrangements at the time of birth of the sibling

It is expected that the father will participate in caregiving and rearing of the firstborn in the period immediately following childbirth. However, the extent to which the father can be active in this period also depends on such factors as the possibility of taking leave from work and delivery in a hospital or at home. First, we shall examine these factors, after which we shall discuss the participation of the father in caregiving during this period.

In four families (1, 2, 3, and 5), the mother gave birth in the hospital. Only one mother (family 1) had to stay longer

Table 4
Circumstances of childbirth

	Delivery in hospital	Firstborn at home after delivery	Father at home after delivery	Other persons interacting with the child after delivery
Family 1	yes	yes	yes	maternity nurse
Family 2	yes	yes	yes	maternity nurse
Family 3	yes	no	**	child stays with relatives
Family 4	no	yes	yes	maternity nurse
Family 5	yes	yes	yes	grandparents

** does not apply

than a few hours, namely 2½ days. In all the above mentioned families, relatives did the babysitting during the mother's stay in the hospital.

One child (family 3) stayed with relatives for nine days. During this period, the child was allowed to visit the parents three times. When the child returned home, the father worked for two more days, and then stayed home for nine days. However, this was not due to his wish to participate in family life, but because the family was moving house.

In the other four families, the child stayed at home during the mother's stay in the hospital. Three families (1, 2, 4) hired a maternity nurse. In family 5, a nurse came only twice a day, just to tend to mother and sibling. In this family, the father took leave for two weeks to care for the family, assisted by the grandparents. After this period, the father and mother tried to share caregiving of both firstborn and sibling. In the other families (1, 2, and 4), the father and the maternity nurse cared for the firstborn . In these families, two fathers (families 1 and 4) were home during the delivery period, one of them (family 1) caring for the firstborn child and not for the baby. Also after this period the tasks in family 1 are shared that way, mother caring for the baby. The father in family 4 tried to be available for the firstborn child during the first two days, and shared caregiving with the maternity nurse for the rest of the time. This child had a great deal of difficulty with the birth of the sibling. It cried a lot, was difficult to handle, and did not want to be cared for by the mother. That is why the father continued to play an important role in caregiving for the firstborn. In family 2, the father was home during four days after birth of the second child and worked for three days during the period that the maternity nurse was present. When she left, the father took leave for a week. He often took the firstborn for a walk or a visit.

Thus, in four out of five families, the father actively interacted with the firstborn during this period. In three families (1, 4, and 5), the more or less traditional division of labor had already been altered before family extension. In one family, the father did not go to work for seven weeks before family extension. In another family, the father was home for six weeks, and returned to work for three weeks before the child was born. In the third family, the father was home more often than traditional fathers because the parents want to share family activities. If the presence of these fathers before the birth of the second child leads to more involvement with the firstborn, it could be expected that this has an effect on interaction similar to the one we expect of family extension. However, even in these families it can be expected that family extension affects the dependent variables. The arrival of the baby necessitates a new division of family tasks in order to care for firstborn and later born alike (Lamb, 1978; Kreppner, Paulsen, & Schuetze, 1982).

If the father is actively involved in caring for the firstborn child - as appears to be the case in four out of five families in this study - this involvement might continue later on (Pedersen et al., 1979). Through the family in which the father does not participate during the delivery period because the child is staying with relatives, we might discover whether changes in interaction are observed after family extension even without increased participation immediately after delivery.

The quality of the attachment relationships with the father and the mother

Six weeks before and six weeks after family extension, the quality of the attachment relationships between child and both parents were observed in a modification of the Strange Situation (for a description see 'Methods').

The relationships with the father appear to change more often than those with the mother (see Table 5). In one family, the relationship with the mother is less secure after the birth of the sibling. The quality of the attachment to the father changes in three families. In one family, the relationship changes to a less secure one, in another family the change is from insecure to secure, and in the last family the

Table 5
Quality of the attachment relationships with the father and the mother, before and after family extension

	Relationship with mother		Relationship with father	
	Before family extension	After family extension	Before family extension	After family extension
Family 1	B	B	A	B
Family 2	B	B	B	B
Family 3	C	C	A	B4
Family 4	B	A	B	B
Family 5	B	B	B	A

A:	anxious-avoidant	B:	secure
B4:	anxious-dependent	C:	anxious-resistant

relationship changes into another type of insecurity. In four families, the child has a secure relationship with at least one parent at both observations. Only in family 3 has the child an insecure relationship to both parents before and after the family extension.

The interactions during supper

In the following section, various aspects of the interactions between child and parents during supper are described. After a discussion of changes in the frequencies of interactions in the family, the changes in the participation of child, father and mother are discussed. The next topic is changes in responsiveness of parents to the child's signals, and the extent to which the child reacts to behavior directed by the parents towards the child. Finally, we shall briefly describe the contents of that behavior.

The changes in the quality of the attachment relationship just described will be related to certain aspects of interaction during supper in the periods of six weeks preceding the observation of the attachment relationship, that is 12 to 6 weeks before and 6 weeks after family extension.

Frequency of behaviors

First we shall discuss the changes in the number of behaviors of father, mother and child during supper. Parents and child are expected to decrease their interactions after family extension because due to the introduction of a new member, the family has to find a new balance in interacting with one another.

There appear to be many differences between the five families in the total number of behaviors. This is not only the result of a different number of observations in different families, as the mean number of scores for each observation demonstrates.

If we only look at the four periods of six weeks in which all families were observed (Table 6), families 1 and 2 appear to interact least (13.1% and 14.9%) and family 5 most (29.1%). The question is whether these differences in the frequency of interaction are characteristic of these families, or of the specific observer. In families 1 and 2, the same observer scored the suppers, in family 3 and 4 another observer, while the third observer was responsible for family 5. Table 6 shows, however, that the mean number of scores for the observers often differs between the two families they observe. We may therefore conclude that these differences are due to the families as opposed to differences between observers.

Table 6
Total and mean frequency of behavior for each family for every six-week-period

	Period							
	1	2	3	4	5	6	7	Totals
Family 1	1014 (145)	818 (205)	1087 (217)	1031 (206)	597 (199)			4547
Family 2	957 (160)	957 (239)	1136 (227)	1587 (265)	816 (272)	1477 (246)	843 (211)	7773
Family 3	1901 (317)	1729 (346)	1568 (261)	1628 (271)	1924 (321)	1848 (370)	1692 (338)	12290
Family 4	1718 (344)	1323 (331)	1782 (297)	1230 (308)	1498 (375)	1499 (300)	1321 (330)	10371
Family 5	2124 (303)	2462 (410)	1869 (312)	2312 (330)				8767

To investigate whether the frequency of interactions in each observation period is influenced by the birth of the second child, we examined the changes between observation periods in the mean number of interactions. The changes or variances occurring within the six-weeks-periods were not analyzed. In four out of five families, the mean number of interactions of child and parents appears to increase between the first and second period before family extension. Because the increase in the first six weeks period is not systematic, it does not appear that what we are dealing with is habituation. In families that show an increase in the periods before family extension, we observed a further increase later on (in three families this increase is interrupted after family extension; this point will be taken up later on). It is possible that this increase in interactions is a sign of increasing motor and communicative abilities of the child, which leads to more behaviors between parents and child. There does, however, seem to be a limit in this regard. After a certain frequency (which is different for every family and above the mean number of behaviors observed before family extension for all families save nr. 5), a decrease in interactions sets in which applies for all families. Such a process (reversed U) is described by Clarke-Stewart and Hevey (1981) for various behaviors between mother and child. Only in family 4 is there an increase again in the last period.

In four out of five families, the mean frequency of behaviors decreases after the birth of the sibling. Because this frequency increases again later on, it seems reasonable to expect that this temporary decrease is associated with the arrival of the sibling. As described, in four families another decrease is observed later on. Factors other than family extension can also influence the frequency of interaction. The periods in which these decreases show up, however, differ between families. Only after the birth of the sibling do all families display a decrease in interactive behavior for the same period.

The results concerning the total number of behaviors during supper appear in four families to be consistent with the expectation of a decrease in interaction after the birth of a second child. After the arrival of a new baby, families have to adjust their interaction patterns. Old patterns can change, and new ones may be introduced (Feiring & Lewis, 1978). This search for other patterns, taking into account interactions with the baby, seems to involve a temporary interruption of existing patterns in the direction of more interaction.

Participation of child and parents

The total number of behaviors during supper appeared to change in every family after the arrival of the second child. In four families, a decrease of behavior is observed, in one family an increase. The next section concerns itself with the share of child, mother and father in these changes. We expect the father to have more interaction with the first child after the birth of a sibling. If the father is successful in compensating for the reduction in attention of the mother for the child, the changes for the child will not be too drastic. The expectation for suppertime interactions follows this pattern: the father's share should increase, the mother's share should decrease and the child's should remain the same.

In all families, more than half of the behaviors scored are displayed by the child (see Table 7). As expected, the child's share remains relatively stable during the entire observation period. Only in family 2 in the first period - between 12 and 6 weeks before family extension - is the behavior scored by the child significantly reduced (sr =-2.6).

The contribution of the father and the mother to the interaction differs between families (see Table 7). In families 1 and 3, the contribution of the father and the mother is equal. In families 2 and 5, the father is more active than the mother. In family 4, in which father and mother are role-sharers, the mother has a greater share than father in five of the seven periods. This difference between this family and the others might be caused by the fact that the father is not employed. Employed fathers only have contact with their child after returning from work. A father who is not employed can interact with the child all day, so he might be more inclined to leave the child to the mother during supper. In only two families do the mother and father display some simultaneous interaction with the child. Separate behavior, however, is more common.

In the following section, we shall discuss for each family changes in participation that occurred during the course of the study. These analyses are based on absolute frequencies, and not on the percentages in Table 7. Unless otherwise

Table 7
Relative participation of child, mother, father and both parents at the same time, in percentages of the total frequencies per period

	Before family extension		After family extension				
	Period		Period				
	1	2	1	2	3	4	5
Family 1							
child	56.2	59.5	55.9	60.8	57.0		
mother	22.2	18.9	19.5	19.7	21.4		
father	19.9	20.9	24.3	18.7	20.9		
both par.	1.7	.6	.3	.8	.7		
totals	1014	818	1087	1031	597		
Family 2							
child	48.9	57.7	53.8	55.5	54.2	57.3	57.5
mother	15.6	14.8	18.1	15.6	21.3	20.2	20.4
father	35.0	27.0	26.6	28.1	23.5	21.2	21.6
both par.	.5	.5	1.5	.8	1.0	1.3	.5
totals	957	957	1136	1587	816	1477	843
Family 3							
child	51.0	54.0	54.1	54.2	54.3	54.2	55.9
mother	21.9	20.8	17.1	21.7	20.9	23.2	22.5
father	24.0	20.7	23.3	20.8	21.4	19.3	18.5
both par.	3.2	4.5	5.4	3.3	3.4	3.3	3.1
totals	1901	1729	1568	1628	1924	1848	1692
Family 4							
child	53.5	53.1	53.9	54.6	56.5	54.7	55.5
mother	19.7	25.0	20.5	27.9	22.1	25.2	24.5
father	20.8	16.8	20.5	12.2	19.4	17.4	17.8
both par.	6.0	5.0	5.1	5.3	2.0	2.7	3.2
totals	1718	1323	1782	1230	1498	1499	1321
Family 5							
child	58.6	61.3	61.2	59.2			
mother	9.8	13.5	18.0	12.7			
father	30.4	24.1	20.1	27.2			
both par.	1.3	1.1	.7	.9			
totals	2124	2462	1869	2312			

stated, only differences with a standardized residual higher than ± 2.58 are described. Changes in the quality of attachment relationships are discussed in relation to changes in participation.

Family 1

In family 1, the father participates more during supper in the first period of six weeks after family extension, but the increase is not significant (sr =+2.4). At the end of the period, the child has a secure relationship with the father, while six weeks before the birth of the sibling the quality was insecure-avoidant. From Table 7 it is clear that the increase in participation is only temporary. In this family, the father was already at home regularly before family extension. This presence did not have an influence on his participation in interactions with the child. The possibility that the effect in the period after the birth of the sibling is a delayed effect of his presence in the earlier period cannot be excluded. However, it is less plausible as the father was working again in the second period after family extension. In the same period a - nonsignificant - decrease in participation is observed.

Family 2

In this family, most of the changes are apparent in the share of the father in interaction with the firstborn child. Especially in the period between 12 and 6 weeks before family extension, the participation of the father is larger than expected (sr =+5.4). In the last two periods - between 18 and 30 weeks after family extension - the participation of the father in interaction decreases (sr =-3.7 and -2.6). Initially, the father had a greater share in interaction with the firstborn than the mother. Beginning in the 12th week after family extension, the parents share more equally in the interaction.

Family 3

The mother participates less in the period immediately after family extension (sr =-3.5). In this period, however, the parents often interact together with the child (sr =+3.5). Because the child was staying with relatives in the first days after the arrival of the sibling, the father could not participate during that particular period of time. Moreover, the mother took the children to stay with relatives for a week. So this father did not have as much contact with the firstborn child as the other fathers. Still, there is an increase in participation in interaction during supper in this first period, although the increase is not significant (sr =+1.9). In the period of 12 to 6 weeks before family extension, the share of the father is significantly larger than in the other periods (sr =+2.7). During this period in particular, the child was often alone with the father, either because father was babysitting or because he took the child to work. Yet the quality of the attachment relationship between father and child is anxious-avoidant before family extension. In the period of six weeks after family extension, the father's part in interaction during supper is about the same as in the first observation period, but the quality of the attachment changed to anxious-dependent. The absolute share of the father did not change, but compared to the mother he did gain ground.

Family 4

In this family, the degree of participation of the father is often opposite to that of the mother. In the first observation period, the father participates more and the mother less than expected (sr =+2.6 and -2.9). The parents behave simultaneously more often (sr =+3.6). Changes in the period after family extension are as expected: participation of the mother decreases (sr =-2.3) and the share of the father increases (sr =+2.4). Both changes are not significant, however. Although the share of the mother is significantly decreased in the period between 12 and 6 weeks before the birth of the sibling (sr =-2.9), the child is securely attached to its mother. After family extension, the participation of the mother decreased as well, but the relationship changed to anxious-avoidant. This change in the relationship does not seem to be linked to the share of the mother in interaction, but to the fact that the child has a lot of problems with the arrival of the sibling (see the paragraph about the arrangements at the time of the birth of the sibling). In the period between 6 and 12 weeks after family extension the participation of the father and the mother in interaction is reversed (father: sr =-4.9; mother: sr =+3.5). The father was ill for a few weeks in that period and could not interact much with the child, and during supper he was not very much involved. In the following periods, the participation of both parents is at the expected level. Only the frequency of behavior of both parents together is reduced in the periods between 12 and 24 weeks after family extension (sr =-4.2 and -2.9).

Family 5

In family 5, the share of the father and the mother in interaction is more symmetrical in the period of six weeks after family extension: the mother is more and the father less active than in other periods (mother: sr =+5.5; father: sr =-4.7). In the period between 12 and 6 weeks before family extension, the father participates more, and the mother less than expected (father: sr =+4.4; mother: sr =-4.5). The difference in participation of the father in the period up to six weeks before birth of the sibling, and in the period immediately after the family extension, appears to be connected to a change in the quality of the attachment of the child to the father, namely of a secure relationship to an anxious-avoidant one.

The expectation that the father participates more during supper after the birth of a sibling appears to hold in three families. In two of these families, a decrease in participation of mother takes place as well (significant in one family). In two other families it is the mother who participates more after the birth of the baby (significant in one family), and in one of these families the father shares less in interaction than before.

In families where the distribution of the interaction during supper between the father and the mother was symmetrical, or where the mother was more active than the father, the father appears to take a greater share in interaction during supper in the 6 weeks after family extension, whether the mother participates less or not. In the two families where it was the father who had a greater share in interaction, the mother is the one who participates more often after the birth of the sibling. From questionnaires completed by the parents six weeks after family extension, it becomes clear that contrary to the other fathers, these two try to occupy themselves with both children equally. Because their other activities with the firstborn remain constant (as appears from questionnaires completed weekly with regard to the presence of both parents and the division of labor between them), the increase in family tasks in these families is larger for the father and smaller for the mother - at least when both parents are at home. The fact that the hypothesis of a larger share of the father in interaction during supper cannot be confirmed in these two families seems to be associated with this increase in family tasks for the father, and with the relatively large share of father before family extension.

The changes are, however, only temporary. In the long run, the distribution between the father and the mother changes back to the distribution discerned before family extension. In one family, the distribution becomes more symmetrical from 12 weeks after family extension onwards. From the data just mentioned concerning the presence of the parents, it becomes clear that the father is more often alone with the firstborn child from that period of time onwards. It may be possible that because father sees more of his child in this way, supper is less important for interaction between father and child.

Changes in the degree of participation of parents with the child appear to be accompanied by changes in the quality of the attachment relationship as determined six weeks before and six weeks after family extension in the modified Strange Situation. In one family, the increase in the share of the father is associated with a change of an anxious-avoidant relationship to a secure one; in another family the relationship changes from secure to anxious-avoidant when the father participates less. The change in quality of attachment in the other families is not related clearly to the quantity of interaction, because the participation in the period before family extension differs significantly from the other periods, and in the same direction as in the period after family extension.

Structural characteristics of sequences of behavior between parents and child

In the results discussed so far, we have devoted attention to the participation of the father, the mother, and the child in interaction during supper. In the period after family extension, a number of changes appear to take place in that participation. To investigate the extent to which changes take place in the responses of the child to behavior directed towards it by the father and the mother, and in the responses of the father and the mother to the child's behavior, we used sequential analyses. When, for instance, the father's increased behavior follows behavior of the child towards the mother, and not the child's behavior towards the father, the father is not regarded as more responsive. It is also possible that no changes are found in the father's part in interaction, but the father's behavior more often follows behavior of the child towards the father, the behavior being more a response to the child's signals. Compared to other investigations into attachments, this is a restricted operationalization of responsiveness. Generally, the appropriateness of the reaction is part of the definition. However, we will only discuss the extent to which the participants react to each other, and not whether the reaction is appropriate in content.

The hypothesis of this study is that after the birth of the sibling, mothers will be less responsive to their child's signals, and that the child will show a decrease in reaction to the mother. In previous research, mothers appeared to show less attention to the child after the birth of another child

(Dunn & Kendrick, 1980), and interactions between mother and child were less contingent upon one another (Taylor & Kogan, 1973). We expect the father to be more responsive to the child's signals and the child to react more to the father.

We will only discuss changes in reactions of the child to a specific parent in response to a behavior of that parent, and in the reactions of the father and the mother to behavior of the child when directed to that parent or to no one in particular. The way parents react to behaviors directed at neither parent in particular is interesting because the child's signals are more diffuse than signals directed at one of the parents. However, we have used all possible response behavior in analysis. Selecting one or a sample of behaviors would lead to false conclusions about the connection between a behavior and its consequences. Because parents do not very often behave simultaneously in three families, we chose not to use this behavior as an antecedent.

For the antecedent behaviors described above, we will discuss the distributions of relevant response behavior in different periods for each family. First, some general points will be discussed, after which the results for each family will be presented.

The distribution of response behaviors. Regarding the whole observation period, more than half of the behaviors of the child are followed by parental behavior (see Table 8).

When the child specifically directs behavior towards one parent, the parent towards whom the child directs itself reacts more often than the other parent in all families. Except in family 5, mothers react more often to specific behavior than fathers. The father reacts more often to the child's non-specific behavior than the mother in families 2 and 5, in family 4 the mother reacts more often, and in families 1 and 3 both parents react to the same extent. The child's behavior is quite often followed by another child behavior. Both after specific and non-specific behavior, the response behavior is usually non-specific child behavior; no behavior of the parents follows. But also when one of the parents does direct behavior towards the child, it often reacts non-specifically. However, behavior directed at that parent is more frequent than other behavior - except for behavior directed towards the mother in family 1. Children react specifically more often to the father's behavior than to that of the mother. It seems that interaction with the father is more attractive than with the mother.

Changes in the distributions. In the following section, changes in the distributions for each family are discussed. As

Table 8

Percentage of behavior following behavior of child, father, and mother, for all observations

a. Behavior following non-specific child behavior

	Non-spec. child behavior	Child to mother	Child to father	Mother	Father	Both parents	Totals
Family 1	39.4	4.4	4.4	24.3	26.3	1.2	1688
Family 2	30.8	12.7	8.8	18.7	27.0	2.0	2031
Family 3	16.2	3.9	5.8	32.7	29.5	11.8	2855
Family 4	16.3	8.3	6.2	34.2	20.5	14.5	2489
Family 5	29.2	5.0	7.5	22.0	33.5	2.9	2674

b. Behavior following child behavior to mother

	Non-spec. child behavior	Child to mother	Child to father	Mother	Father	Both parents	Totals
Family 1	31.4	7.2	1.5	43.2	16.5	.3	389
Family 2	21.5	7.3	4.0	49.8	15.9	1.5	948
Family 3	20.8	6.7	5.3	50.9	14.4	1.9	1706
Family 4	13.4	7.4	4.2	64.2	9.5	1.3	1610
Family 5	31.9	7.9	5.9	40.6	13.4	.3	774

c. Behavior following child behavior to father

	Non-spec. child behavior	Child to mother	Child to father	Mother	Father	Both parents	Totals
Family 1	41.1	3.8	8.7	15.7	29.8	1.0	504
Family 2	22.1	6.1	11.8	11.7	47.9	.5	1233
Family 3	26.3	6.4	6.7	15.6	42.5	2.4	2009
Family 4	16.8	6.1	9.5	9.1	56.3	2.3	1535
Family 5	31.2	3.3	11.8	6.7	46.7	.4	1708

d. Behavior following behavior by mother

	Non-spec. child behavior	Child to mother	Child to father	Mother	Father	Both parents	Totals
Family 1	39.5	27.5	2.3	14.2	16.3	.2	888
Family 2	25.9	30.8	6.3	11.6	25.0	.4	1359
Family 3	27.8	47.0	4.6	7.9	12.2	.5	2576
Family 4	33.6	43.0	6.9	9.0	7.0	.5	2370
Family 5	39.8	41.6	3.6	5.3	9.6	.1	1146

e. Behavior following behavior by father

	Non-spec. child behavior	Child to mother	Child to father	Mother	Father	Both parents	Totals
Family 1	33.9	2.8	38.3	11.1	13.5	.3	926
Family 2	27.9	6.1	39.8	10.1	16.1	.2	1979
Family 3	22.8	4.0	56.5	7.7	8.6	.5	2588
Family 4	28.9	7.2	50.8	5.5	7.2	.3	1863
Family 5	27.4	2.1	55.4	2.9	12.3	.0	2195

mentioned before, we will only describe the extent to which the father and mother react to specific and non-specific behavior, and the reactions of the child to the parents.

Family 1

In this family, there are almost no significant changes in the extent to which parents react to the behavior of the child, or in the reactions of the child to the parents. Only in the period between 12 and 6 weeks before family extension does the child react less often to the mother when the mother directs herself to the child (sr =-2.7) and more often to father (sr= +3.1). Two non-significant changes in father-child interaction appear to synchronize with the change in quality of the attachment relationship observed in the Strange Situation. In the period up to 6 weeks before family extension, the father reacts less often when the child shows non-specific behavior (23.1%; sr = -1.2), in the period after birth of the sibling more often (31.0%; sr =+1.7). After family extension, the child also reacts more often to the father after behavior of the father towards the child (before: 27.0%; sr =-2.5; after: 44.3%; sr =+1.6).

Family 2

Also in family 2 only one period shows a significant change. When the child behaves non-specifically, the father reacts more often in the period between 12 and 6 weeks before family extension (sr =+2.8).

Family 3

In the reactions of the parents following child behavior, or of the child following behavior of the parents, no significant changes are observed. Only in the period immediately after the birth of the sibling do the parents behave simultaneously more often when the child behaves non-specifically (sr =+3.9).

Although these parents often react to the child's behavior, and the child to parental behavior, both in specific periods and for the whole period, there seems to be a disharmony in this interaction. This is demonstrated by reactions of the parents and the child, not described in this chapter, which are more often significant in the separate periods than in other families. There are significant increases and decreases in non-specific behavior following the mother's or the father's behavior, reactions to the mother's behavior with behavior towards the father, reactions to the father's behavior with behavior towards the mother, and general changes in the child's behavior towards the parents or towards no one in particular. The sequential analyses reported here do not therefore indicate the change in quality of the attachment to the father from anxious-avoidant to anxious-dependent, but the inconsistencies in interaction described might explain the fact that in this family, the child has insecure relationships with both parents before and after family extension.

Family 4

In family 4 the child shows a decrease in behavior towards the mother as a response to the mother's behavior in the period after the birth of the sibling (sr =-3.5). In the period between 12 and 18 weeks after family extension, the father reacts more often when the child directs behavior towards father than in other periods (sr =+2.6). When the child behaves non-specifically, the father and the mother react more often simultaneously in the period between 12 and 6 weeks before (sr =+3.4), and between 6 and 12 weeks after (sr =+2.8) but not between 12 and 18 weeks after family extension (sr =-4.4).

The decrease in the extent to which the child reacts to the behavior of the mother in the period of 6 weeks after the birth of the baby is accompanied by a change in the quality of the attachment relationship with mother from secure to anxious-avoidant.

Compared to the period of 6 weeks before family extension, the mother reacts more often in the period six weeks afterwards when the child directs itself towards her (from 54.1% to 61.7%), and slightly more often when the child behaves non-specifically (from 29.7% to 32.8%). This responsiveness of the mother is not sufficient to prevent a change in quality of attachment to insecurity.

Family 5

In both periods after the birth of the sibling the child reacts more often with behavior to the mother after behavior of the mother (sr =+4.5 and +2.6)) and less often with non-specific behavior (sr =-3.7 and -2.2), while previously the reverse pattern was observed (sr =-4.1 and -3.7; +3.3 and +3.2). This mother reacts less often when the child directs itself towards her (from 48.6% to 41.9%), and more often after non-specific child behavior (from 18.7% to 24.3%; none of the differences are significant). The mother seems to emphasize her role during supper: in the period after family extension, she often intervenes when the father does something, a behavior not observed up to this time.

The father reacts more often than expected after non-specific child behavior in the first observation period (sr

=+2.9). After family extension, the father only reacts to 27.4% of these behaviors (was 40.1%). The extent to which the father reacts following the child's behavior directed towards him decreases as well (before: 50.6%; after 42.8%), and this is also the case for the father's behavior the child is responding to (from 56.1% to 52.1%; both differences not significant). The change in the quality of the relationship to the father agrees with these observations: the secure relationship changes after family extension into an anxious-avoidant attachment relationship.

These results show that changes in child or parent reactions in the period of 6 weeks after family extension are less marked than changes in frequency of behaviors or in the participation of both parents.

Only two families show changes in mother-child interaction in the period of six weeks after family extension. These changes do not take place in the mother's responsiveness, but in reactions of the child to the mother's behavior. In one family, the child shows a decrease in its reaction to the mother. Compared to the observations in the modified Strange Situation six weeks before the birth of the sibling, the quality of the relationship changes to anxious-avoidant. The decrease in reactions of the child to the mother corresponds with avoidant behavior at reunion episodes in the playroom. In the other family, the child reacts more often to the interaction of the mother. The secure relationship does not change in this family.

In two families in which the quality of the attachment relationship with the father changes between the two observations in the modified Strange Situation, differences appear in interaction during supper in the preceding periods, but these are not significant. In the family in which the anxious-avoidant relationship changes to a secure one, the father reacts more often to the child, and the child to its father. The change from secure to anxious-avoidant attachment corresponds with a decrease in reactions of the child and the father to each other. However, some of these changes had already shown up before the birth of the second child, a period during which neither fathers worked.

The change of an anxious-avoidant relationship to the father into an anxious-dependent one after the birth of the sibling is not reflected in changes in father-child interactions. This might be caused by the fact that, generally speaking, differences in parent behavior show up most clearly when securely attached children are compared to anxiously attached ones, and not within different types of insecure attachments (Ainsworth et al., 1978).

It seems clear that not only the responsiveness of both the mother and the father, but also the extent to which the child reacts to interactions of parents can be influenced by the arrival of a second child, although the differences with other periods are often not significant. The expectation that mothers react less to child signals, and fathers more often, seems too simple. Both an increase of responsiveness of the mother and decrease on the father's part appear to be possible. Also, the reactions of children can change in unexpected directions, for example more frequent reactions to the mother's behavior or less frequent reactions to that of the father. Individual differences in changes during family extension (Dunn & Kendrick, 1980; Taylor & Kogan, 1973) appear to apply to father-child interaction as well. The results indicate that when no changes take place in responsiveness of the parent, the child can still feel "dethroned" by the arrival of a sibling (Feiring & Lewis, 1984).

In one family, the changes in responsiveness of the father, and in reactions of the child to the father, are observed to remain constant, despite the fact that the participation of the father in interaction was increased only in the period of 6 weeks after family extension (see the paragraph about the participation of child and parents). This father plays a larger role in other activities with the child as well.

The contents of behavior of parents and child

For a number of structural characteristics of interaction during supper, we were able to distinguish certain patterns in the changes taking place in the families after family extension. We will now discuss the contents of behavior (for a description see 'Methods') in the various periods. This discussion will be broader than the discussion of the structural characteristics. First, the distribution of behaviors during supper for the whole observation period will be reviewed, followed by the changes in frequencies of different categories.

The distribution over the categories. Taking the observation period as a whole, we see that the behavior of the children is specifically characterized by three behavioral categories: motor behavior (the most obvious one during supper, usually eating), vocalizing and attention. Play plays a rather large part in the behavioral pattern of the child as well, although to a lesser extent than the previously mentioned categories. This play does not take place due to the child's finishing supper before the parents (and being given toys to play with until supper is over). During supper playing and eating alternate. The other categories - compliance, negative behavior and attachment behavior -form a much smaller part of the behavior shown by the child (see Table 9).

In the case of the mothers, caregiving, vocalization and attention stand out. In one family, notably little attention for the child has been scored. Categories like stimulation and correction are less frequent. Playing with the child and affection are the least frequent categories for most mothers.

With fathers, the largest share of their behavior consists of caregiving and vocalizing. Also for fathers we regularly come across the categories stimulation and correction, as well as attention and play. Compared to the mothers, the fathers pay less attention to their child, but play more during supper.

Changes in the distribution over categories. Since the behaviors of each of the interactors are interlinked, data on the child, the mother and the father have been analyzed together.

Before we come to the changes over time for each family, some general statements will be made about the results. A large variability of behaviors over time appears from the standardized residuals of the distributions over the categories. For many categories no sustained increases or decreases over the periods occur. The behavior of the parents and the child is apparently influenced by a number of factors, even when the influence of coincidental events on the data is eliminated by clustering over periods of six weeks. Several factors that might play a part in parent and child behavior have been discussed previously (see 'Methods' and 'Arrangements'). In addition, certain developmental stages of the child and various strategies parents adopt in interacting with the child (depending upon their intentions in a certain period) can be taken into consideration. A child that has learned to speak well will talk more - perhaps influenced by the enthusiasm of the adults about this new skill. A child that has just learned how to eat on its own will show a relatively great amount of motor behavior for a few weeks, as its eating behavior is not yet very efficient. When parents decide that their child should learn to eat on its own, they will show less caregiving behavior and stimulate the child more often. As soon as this skill is firmly established within the child's behavioral repertoire, the number of stimulations will decrease.

This kind of temporary change will, however, not be discussed. Changes in the contents of behavior for the child, the mother and the father will only be discussed when two criteria have been met: a) A significant standardized residual for at

Table 9
Distribution of behavior during supper over different categories

a. The share of each of the categories for the total observation period for the children

	Fam.1	Fam.2	Fam.3	Fam.4	Fam.5
attachment	1.9	.7	1.2	.2	1.1
play	10.9	12.4	4.4	4.8	8.0
compliance	.5	1.0	2.3	2.3	1.7
vocalization	25.8	43.4	20.3	36.4	32.9
attention	23.4	20.7	30.2	20.6	17.6
motor behavior	32.2	20.5	39.3	34.8	35.6
negative behav.	5.2	1.4	2.3	.9	3.1
totals	2632	4286	6627	5654	5266

b. The share of each of the categories for the total observation period for the mothers

	Fam.1	Fam.2	Fam.3	Fam.4	Fam.5
attachment	1.3	2.4	3.8	2.3	1.9
play	2.0	7.1	1.5	2.4	.3
stimulation	5.4	5.8	13.8	11.6	3.2
caregiving	37.4	15.8	26.6	16.5	28.9
vocalization	47.2	44.5	30.0	33.1	21.6
attention	3.5	17.1	16.6	26.3	32.5
other non-verbal behavior	2.2	.9	1.7	1.3	1.6
correction	1.1	6.4	5.8	6.5	9.9
totals	923	1388	2607	2398	1171

c. The share of each of the categories for the total observation period for the fathers

	Fam.1	Fam.2	Fam.3	Fam.4	Fam.5
affection	3.6	3.3	3.0	1.6	5.1
play	2.8	11.5	5.4	7.1	3.9
stimulation	1.4	7.9	13.0	10.8	4.7
caregiving	49.7	16.3	39.1	21.9	33.5
vocalization	31.2	48.8	19.7	33.8	38.2
attention	2.8	7.3	12.4	13.3	8.6
other non-verbal behavior	6.0	1.2	2.8	3.6	.1
correction	2.6	3.6	4.7	7.8	5.0
totals	955	2028	2601	1883	2241

least one period of six weeks, and b) a sustained change in the sense that a higher or lower frequency takes place for more than one period (not necessarily significant, but in the same direction as the significant standardized residual). A significant residual in the period immediately after the birth of the sibling will, however, always be discussed. Categories with a low frequency (less than 20) will not be discussed. This applies in family 1 for compliance on the part of the child; affection, play and correction on the part of the mother; and stimulation on the part of the father. For family 4 this applies to attachment behavior of the child, and for family 5 play on the part of the mother. Furthermore, we will not go into the category non-verbal behavior of parents. As described before, this subcategory is a "remainder" category, and of no significance where content is concerned.

The changes in the contents of behavior of the children do not appear to be uniform for the five families. One child (family 1) displays negative behavior more often in the periods after the birth of the sibling than before (before: sr =-4.3; after +3.2). In the period of six weeks after family extension, the child plays less often than in the remaining periods (sr =-4.4). The child less often displays attention before family extension than afterwards (before: sr =-3.4; after: +2.6). For the child in family 2 attention plays a smaller part in his behavior, both before and six weeks after family extension than thereafter (first periods: sr =-4.7 and -3.7; later periods: sr =+4.1). A great number of changes occur in the behavior of the child in family 3. It plays more often in the period of six weeks after the family extension than in the other periods (sr =+7.3; later periods: sr =-3.7, -3.2), but it vocalizes less often (sr = -3.1). In both periods before the birth of the sibling, compliance is less frequent (first periods: sr =-2.7; later periods: sr = +4.1) as is motor behavior (before: sr =-3.4; after: sr =+4.5). For the child in family 4, vocalization plays a smaller role in its behavior than motor behavior in the periods before and six weeks after family extension, whereas in later periods the opposite pattern appears (vocalization: first periods: sr = -5.3 and -3.4; later periods: sr = +4.0 and +2.6; motor behavior: first periods: sr =+2.9; later periods: sr =-3.6). In family 5, no systematic changes take place in the content of the child behavior.

We observed, as did Dunn and Kendrick (1980), individual differences in changes in the content of child behavior, and both progression and regression in child behavior after family extension (Dunn, Kendrick, & MacNamee, 1981). Examples of progression are increases in compliance and vocalization. Displaying more negative behavior can be considered a sign that the child is out of balance, just as - although less obvious - a greater role for attention compared to more active behaviors.

The following changes occur for the mothers in the frequencies of various behaviors. In family 1, the mother stimulates the child more often before family extension (sr =+3.5). In family 2, the mother plays less frequently and pays less attention to the child before family extension, the latter behavior being also less frequent six weeks after birth of the sibling (play: sr =-2.6; attention: first periods: sr =-3.8, -2.8, and -2.7, later periods: sr =+3.6). In family 3 quite a few changes occur for the mother. Both stimulation and correction are less frequent before family extension and - to a lesser extent - six weeks afterwards, and more frequent later on (stimulation: first periods: sr =-2.9; later periods: sr =+4.4) (correction: first periods: sr =-2.6; later periods: sr =+3.1). Before and six weeks after birth of the sibling, the mother more often pays attention to the child, and afterwards less (first periods: sr =+2.9, + 6.1; later periods: sr =-3.9, -2.9). Only during the period of six weeks after birth of the sibling does the mother vocalize less often than in other periods (sr =-4.5). In family 4, the mother stimulates the child more often in the period before family extension (sr =+6.1). Immediately after the family extension, the mother displays less caregiving (sr =-2.8), but this was also the case in the period between 12 and 6 weeks before birth of the sibling (sr =-3.4). From 6 weeks after family extension, the mother vocalizes more than before (first periods: sr =-2.9; later periods: sr =+3.4). The mother in family 5 displays less frequent caregiving in the period before family extension and more frequent attention, after family extension the reverse patterns emerge (caregiving: sr =-7.6, -5.7, +10.0, +4.2; attention: sr =+2.6, +6.7, -4.2, -5.6). Also affection is more frequent after family extension (sr =+3.4). During the first 6 weeks after the birth of the sibling, the mother vocalizes more often (sr =+3.4).

For a number of families, the changes in the mother's behavior appear to be in accordance with previous research into family extension, such as a decrease in several measures reflecting attention for the child (Dunn & Kendrick, 1980), an increase in correction and angry remarks by the mother (Dunn & Kendrick, 1980; Trause, Voos, Rudd, Klaus, Kennell, & Boslett, 1981), and a decrease in distal interaction like vocalization (Feiring et al., 1983). These changes in mother-child interaction could point to a turn for the worse in this relationship. Changes in the opposite direction, however, appear as well. Mothers stimulate the child more often, play or vocalize more often, pay more attention or display more affection. For a number of families, changes in both directions take place. These positive changes could provide compensation for the previously mentioned changes in the mother's behavior. The fact that in four families the quality of the attachment relationship with the mother six weeks after birth of the sibling is the same as before family extension seems an indication in this direction. In the family in which a secure relationship changes to an anxious-avoidant one, there are not many differences in the mother's behavior between the period from 12 to 6 weeks before, and the period of 6 weeks after birth of the sibling. As described before, changes in the child's behavior seem more important than changes in the mother's behavior in this family.

Finally, we will go into the changes in the contents of the behavior of the fathers. In family 1, the father vocalizes more often to the child in the period of 6 weeks after family extension (sr =+3.9). The father in family 2 pays less attention to the child before and 6 weeks after family extension, and more attention from 12 weeks after (first periods: sr = -3.3; later periods: sr =+2.6, +4.1). The father stimulates the child more frequently in the period before family extension than afterwards (before: sr =+7.5; after: sr =-3.1). In family 3, the child plays more often in the period of 6 weeks after family extension, and also for the father playing increases in this period (sr =+5.5). Stimulation and caregiving are more frequent for the father in family 4 before than after the birth of the baby (stimulation: sr =+2.6; caregiving: before: sr =+5.3, after: sr =-4.0). However, immediately after family extension the father vocalizes more often than before (sr =+3.1). The father in family 5 appears to be playing and caregiving more frequently before than after family extension. For both behaviors the frequency already appears to decrease in the period of 6 weeks before family extension when the father is home often because of a strike (play: sr =+3.5; caregiving: before: sr =+7.1, after: sr =-6.3).

As is the case with mothers, changes in the content of behavior of the fathers are in positive and negative directions. Fathers not only vocalize more often, play more, and pay more attention to the child, but also display less frequent stimulation and caregiving. In the family in which the father shows more playing and stimulation behavior before family extension, the quality of the attachment relationship changes from secure to anxious-avoidant after the birth of the sibling. A change from an anxious-avoidant attachment relationship to a secure one occurs in the family in which the father vocalized more to the child after family extension. In the family in which the father plays more often in the period of 6 weeks after family extension, the attachment relationship appears to change from anxious-avoidant to anxious-dependent.

CONCLUSIONS

In a longitudinal study, five families were observed weekly at home during supper for several months before and after the birth of a second child. Six weeks before and six weeks after family extension, the quality of the attachment relationship between child and parents was assessed in a laboratory playroom.

After the birth of a sibling, the parents have to divide the family tasks between themselves in such a way that both children get enough care and attention. We expected the father to take a greater share in caring for the firstborn child, beginning in the period immediately after the birth of the sibling. In four families this was indeed the case. However, the consequences of the birth of the sibling for the interactions between parents and firstborn child differ between families.

In all but one family the frequency of interaction decreased in the period of six weeks after family extension. The way the participation of the mother and the father is influenced seemed to depend upon the distribution of interaction between the parents before the arrival of the sibling. Only in families in which the distribution of interaction between parents was symmetrical, or in which the mother was more active than the father, did the father's share in interaction increase. In families in which the father participates more than the mother, the mother increases her share in interaction after the birth of the sibling.

Different kinds of changes in sequences of behavior were observed. Reactions of the father and the child to each other showed increases or decreases after family extension; the reactions of the child to the mother varied as well. Also the contents of behavior of the child and its parents were observed to change in positive and negative directions. These results show that the birth of a sibling does not affect interaction in the same way in all the participating families. In addition, in most families only temporary changes in interaction pattern were observed. The results of this study indicate that not only the relationship between the firstborn child and the mother, but also between the child and the father can be influenced by the birth of a sibling. The changes in interaction correspond to changes in the quality of the attachment relationship between child and parent, at least for the period of six weeks after family extension. The fact that for two children the secure relationship with the father or the mother changed to an insecure one after the birth of the sibling demonstrates the importance of participation of both parents in the attachment network. In a transitional period such as family extension, a secure relationship with at least one of the parents may facilitate the adjustment of the child to the new circumstances.

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Tables including all standardized residuals can be obtained from the author.

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CHAPTER 9

MATERNAL UNRESPONSIVENESS AND INFANT CRYING. A CRITICAL REPLICATION OF THE BELL & AINSWORTH STUDY

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ABSTRACT

The present study reports an effort to make a critical replication of the longitudinal naturalistic Bell & Ainsworth study (1972).

Twenty-five infant-mother pairs were observed in their homes at three-weeks intervals during the first nine months. This report focuses on the main conclusion of Bell & Ainsworth (1972) that mothers who responded more consistently and promptly to their infant's crying in earlier quarters had infants who cried less frequently and for shorter periods of time in subsequent quarters. The evidence of this study suggests that regarding the durational measures this conclusion is based on "spurious correlations", control of likely antecedent and concurrent determinants of infant crying yielded partial correlation patterns contradicting the Bell & Ainsworth conclusion. These striking findings are discussed in an evolutionary context with reference to the balanced view that crying behavior is not an on/off signal *but a graded signal*. Consequently, *differential responsiveness* seems to be more adequate.

INTRODUCTION

Infant crying implies many young parents' first confrontation with the drawbacks of child-rearing. Some types of loud and prolonged crying provoke physiological reactions comparable to

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reactions in situations in which one is continually insulted, treated condescending or even receiving electric shocks (Frodi, 1985a, p.360). No wonder that excessive crying has been identified as one of the main causes of child abuse and neglect (Frodi, 1985b). Therefore, it is necessary to prevent or combat excessive crying through effective interventions by the caregivers. The question is which parental behavior may be regarded as effective. If crying is only regarded as a nuisance, and merely viewed as an abject but meaningless vocalization, an obvious solution is to try to decrease its frequency and intensity by neglecting it. If, however, some reason or function is attributed to crying, it is self-evident to take its signal value seriously, and consequently to try to remove the cause or reason, or to react some other way to the signal.

Attachment theory and crying behavior

From the perspective of attachment theory, crying is attributed the function of maintaining the baby's proximity to protective adults. The so-called expressive crying in the first few months has the function - and not the intention - of informing the environment about the needs of the organism, for example the need for food, or company, or removal of the source of pain. Expressive crying does not contain intentional signal value, but rather the environment regards it as a meaningful signal. Bowlby (1971) supposes that crying belongs to the class of pre-attachment behaviors, such as sucking and smiling, that served the human species in its evolutionary struggle for life. This type of behavior unintentionally stimulates proximity to the caregiver and originally served as protection against attacks from predators, etc. In the cybernetic model of attachment theory it is plausible to consider crying to be terminable by a quick response from the caregiver, instead of being reinforced. If crying is seen as directed towards the goal of proximity to the caregiver, reaching that goal should be enough "reason" to end the crying behavior. It is supposed that much crying due to a seemingly physical cause should ultimately be considered as socially oriented. Expressive crying, too, is supposed as having a communicative function.

For that matter, mothers often think that infant crying in the first few weeks and months after birth can effectively be combatted by changing diapers. Wolff (1969) did research in which he asked caregivers to change diapers of nine babies six times. In half of the cases he asked the caregivers not to give the baby a new and dry diaper, but to replace the wet one. Babies without a new diaper appeared to stop crying after the diapering ritual as fast as babies with a dry and clean diaper. Wolff had made sure the babies' temperature at the same level in both groups: a decrease of temperature caused by a wet diaper would stimulate crying behavior (Wolff, 1969, p.88). This "simple" study appears to indicate that the baby is crying to make contact with the caregiver, and that crying behavior is terminated if the set-goal of 'proximity' is realized. In his crying studies, Wolff (1969) also showed that rocking the baby in a rhythm of 80-140 moves per minutes was effective in terminating crying behavior. Bowlby took this result as a confirmation of his idea that crying is rooted in evolution. He supposes that the baby at least needs the rhythm of a slow walk to feel itself safe and consequently to stop crying, and he refers to the way in which babies were probably carried around by their mothers in the environment of evolutionary adaptedness (see also Murray, 1979).

This interpretation of crying did not incline Bowlby to propagate a prompt response to every kind of crying behavior. For the very reason that crying does have signal value, the perception of intensity, temporal structure and context has to determine the attribution of meaning to the behavior. Dependent upon the information the crying behavior is carrying, caregivers could respond promptly or slowly: "As a rule, crying leads a mother to take steps to arrest it; this she does either instantly, as when she hears a sudden pain cry, or in her own time, as when rhythmic crying builds up gradually" (Bowlby, 1971, p.347). From this quotation it may be understood that Bowlby does not consider crying as an on/off signal to which the same meaning should be attributed in all cases, and to which one would have to always respond in the same prompt way. For him crying is a graded signal (Murray, 1979) with a range of possible interpretations.

The idea of crying as a graded signal leads to the question whether merely on acoustical grounds the right meaning can be attributed to different types of crying behavior. There has been some experimental research done on the signal value of different types of crying, such as the pain and hunger cry. The research group of Wasz-Höckert. Partanen, Vuorenkoski, Valanné, and Michelsson (1964b;1968) did produce empirical evidence in favor of the thesis that it would be possible to discriminate different cry-types merely on acoustical grounds. This research has been sharply criticized methodologically (Muller, Hollien & Murry, 1974) but a replication study of Brennan and Kirkland (1979), who bore the criticism in mind had the result that musically trained observers were capable of discriminating different types of crying vocalizations. From the studies of Gladding (1978;1979; 1980) it was derived that training and experience with children influence competence in distinguishing crying vocalizations. Sagi (1983), too, demonstrated that having children stimulates competence in distinguishing between different cry signals, and that generally having experience with children leads to better cry discrimination. Sagi (1983) speculated about the existence of a predisposition which would naturally attune the mother to her own baby (referring here to the Bell & Ainsworth, 1972 study we will discuss below). Be that as it may, the research literature shows that training the discriminatory competence is an effective means for learning to identify different cry vocalizations in an experimental setting.

More important than experimental research for understanding crying in natural settings are the studies done by Wolff (1969; 1976). He, for example, did an experiment in the home setting regarding the relation between type of crying and maternal response. While the mother was present in an adjacent room, Wolff played a certain cry type on audiotape and measured the latency of response. Furthermore, verbal reactions of the mother were registered. Almost every mother appeared to respond very promptly and anxiously to a pain cry. The mothers reacted quicker to a mad or angry cry than to a hunger cry in order to check the baby's well-being without really being alarmed. The mothers were more or less amused by the anger of their baby. Mothers did not react in a fixed pattern to the hunger cry; consequently, Wolff suggested a correspondence with the global caregiving style of the mother. If the long expiration phase was deleted from the pain cry, mothers appeared to be less anxious than in case of a real pain cry. The cry of a baby after repeatedly offering and taking away a pacifier seemed to be similar to the pain cry. The difference, however, is the absence of a long expiration phase. Mothers did react to this kind of crying less anxiously but with the same promptness as in case of a pain cry, from which the long expiration phase is deleted.

From research regarding the signal value of crying it can thus be derived that different cry types lead to different interpretations and reactions. Crying is not an on/off signal intensity, temporal structure (e.g., length of expiration phase) and context give every cry its specific meaning. For almost every caregiver a long and ominous expiration phase appears to be reason enough to respond spontaneously and promptly, but a more gradual building up of the cry pattern gives more room for adopting a wait-and-see attitude.

If crying has an evolutionary based function, it is plausible that certain cry types do have some definite signal value, and represent compelling "calls" for proximity and security (Murray, 1979). Intense crying with or without a long expiration phase may possibly have such a function. In that case, the only response of the caregiver should be to seek the baby's proximity, in search for the cause of its distress. Other types of crying vocalizations would have much less unequivocal connections to a certain kind of distress, and therefore leave room to much more diffuse responses from the caregiver. This kind of crying may have much less of a releaser function (Murray, 1979) as compared to the intense cry, and its evolutionary bias would be much less obvious. For the survival of the species, fussing would have a somewhat different function as long and loud, anxious crying. Against this background, Bowlby's comment is understandable that to "A cry that starts at low intensity ... (the mother's) response is likely to be more leisurely" (Bowlby, 1971, p.298).

Bell and Ainsworth's radical theory of crying

A radical interpretation in the seventies was substituted for the balanced view of the "founding father" of attachment theory on the function of crying and its adequate response. Bell and Ainsworth's (1972) study on "Infant crying and maternal responsiveness" raised a good deal of dust, not only because of the data but also because of its polemical style. The researchers did not confine themselves to a cool presentation of data from the perspective of attachment theory, but initiated a discussion with conditioning theory. Their intention was to place doubt as to the validity of the latter in explaining the development of crying behavior. Without relating this discussion here, we would like to describe the Bell and Ainsworth study somewhat more extensively, because it has served as a model for the critical replication study to be reported afterwards.

We have spoken about the radicalization of attachment theoretical ideas on crying because the global conclusion of the study was that consistently and promptly responding to almost all forms of crying would result in a decrease of crying during the baby's first year. This conclusion was embedded in a general view on the relationship between maternal responsiveness and development of the child's competence. Responsive reactions to crying would lead to refinement and enlargement of the child's communicative competence, replacing disturbing forms such as crying and fussing. It was also suggested that responsive reaction to crying would stimulate the development of trust and self-reliance. The infant would derive a feeling of competence and mastery over the environment from the perception of a prompt reaction to its crying. If the child really feels in danger it anticipates short latencies in the caregiver's response. In mild distress it does not feel urged to alarm the environment directly by crying. During the last months of the first year crying behavior would only be activated by extreme anxiety and distress.

By embedding the relationship between responsiveness and crying behavior in a fundamental view on the complex relationships between parental reaction and child's competence, research on crying evolved into a "pièce de résistance" of attachment theory. Besides the undifferentiated view on crying, which was considered as attachment behavior in almost all forms, this embedding contributed to a radicalization of thinking about crying and responsiveness. It constituted a cornerstone of attachment theory and therefore was not really open to theoretical and empirical criticism. Especially because of the practical relevance of the cry study, it would have been better if the discussion had been radicalized less quickly, and if more time had been spent on carefully testing the hypothesis. In reacting to the devastating criticism of Gewirtz and Boyd (1977), Bell and Ainsworth felt obliged to stress the explorative nature of their Baltimore study and to underline the need of replications (Ainsworth & Bell, 1977).

The design of the study and the data analysis indeed show the explorative character of the project. The study was done on a middle class Baltimore sample. 26 mother-infant dyads were visited at home for about four hours per three weeks, during the whole first year after the birth of the baby. Observers took notes while observing unobtrusively the mother-infant interactions, which were later written out as a narrative account. Time intervals of five minutes were marked off in the accounts, but time-markers were included irregularly by the observers (Lamb, Thompson, Gardner, & Charnov, 1985, p.60); therefore the duration of activities and events sometimes had to be estimated afterwards. Because of the semiparticipant role of the observer and the paper-and-pencil method of registration, duration and frequency of crying could not always be measured very precisely. The narrative accounts contained reports on interactions, evaluations of observers, and comments of the mother on her infant. At the end of the first year the dyads were observed in the Strange Situation procedure. The narrative accounts were coded afterwards on several scales and measures, and intercoder agreements were established. In the narrative accounts, every cry-event during the home visit was coded. In particular the following variables were measured: duration of crying, whether mother responded to the crying, and if so, how long she waited before reacting. The main question Bell and Ainsworth (1972) posed concerned the relationship between maternal responsiveness and frequency and duration of crying during the baby's first year. The direction of the influence would also have to be unravelled. The measures for crying behavior contained fussing as well as crying, and very short crying as well as long and intense crying. Bell and Ainsworth constructed two measures: a) Frequency of crying episodes per waking hour; b) Total duration of crying in minutes per waking hour. Two important measures for maternal responsiveness were constructed: a) The number of crying episodes ignored by the mother; 2) Duration of maternal unresponsiveness, e.g., number of minutes per waking hour during which the baby cried without or before a maternal intervention.

Results of the longitudinal study seemed to be unequivocal. First, crying in the first half year appeared to be much less stabile than maternal responsiveness. This would exclude a purely constitutional explanation (e.g., irritability) for the differences in crying behavior at the end of the first year. Secondly, correlations between crying measures and measures for maternal unresponsiveness were computed. After correction for confounding of these measures in computing correlations for the same quarter (a correction which was criticized afterwards by the authors; see Ainsworth & Bell, 1977), the relationship within the first two quarters seemed to be less strong than in the last two quarters. Except in the first months, there was a tendency of more and longer crying by infants whose mothers were less responsive. The same seemed to hold true for the correlations across the quarters. Less responsive reactions to crying in the first quarter correspond with more frequent crying in a later quarter. The reverse seemed not to be true, namely that much crying in an earlier period corresponded with less responsiveness later. However, this reversed relationship appeared to be true in the second half year, reason for Bell and Ainsworth to warn against a vicious circle; if mothers are less responsive in the first quarters, longer and more frequent crying is the consequence, which, in its turn, leads to less responsive behavior in the last two quarters. All reported correlations were non-parametric.

The study thus seemed to have produced clear-cut results, which therefore played an important role in scientific as well as in practical discussions. However, the study has also been criticized very sharply. The most important criticisms came from Gewirtz and Boyd (1977) and Lamb et al. (1985). Gewirtz and Boyd made the following points amongst others: 1) Mother and infant variables are principally confounded. A mother cannot be responsive nor unresponsive if the child does not cry. The correction of Bell and Ainsworth cannot be a solution to this problem. 2) In computing the correlations across quarters, important concurrent and antecedent variables were not controlled. (It would have been important, for example, to control for unresponsiveness in the same quarter and infant crying in an earlier quarter in computing the correlation between crying in a later and responsiveness in an earlier quarter).[1] Through the use of non-parametric methods partializing was impossible, but the quality of the data would permit use of parametric correlation coefficients. 3) The measurement of central variables was not precise enough to state conclusions about the absence of operant conditioning. The latter criticism of inexact measurements was also brought forward by Lamb et al. (1985). They remarked that the data collection procedure of narrative accounts, to which rating scales and frequency measures were applied afterwards, cannot exclude the possibility of the narrative accounts containing much error variance. No exact information on the reliability of these accounts is available. In addition, time-markers were not consistently used. Therefore, Lamb et al. concluded that replication would be necessary to confirm the generated hypotheses. In fact, this conclusion corresponds to the opinion of Ainsworth and Bell (1977) themselves in their polemic discussion with Gewirtz and Boyd: "We hold that the only satisfactory answer to the substance of the criticism that Gewirtz and Boyd raise is replication of findings with another sample" (p.1211). The question is whether such a replication has already been realized since the publication of the original study some fifteen years ago.

Replication of the Baltimore study on crying

The most important studies in which at least a partial replication of the Baltimore cry study was conducted, were reported by Belsky, Rovine and Taylor (1984), Grossmann, Grossmann, Spangler, Suess and Unzner (1985), Crockenberg and Smith (1982), and Landau (1982). The first two studies were carried out in the U.S.A., the third study was done in Bielefeld (West-Germany), and the last study in Israel. All the studies contained hypotheses in addition to the question of the relationship between crying and responsiveness, but we will focus here on this problem alone. We also do not pretend to give a complete review of all replicatory studies, but believe the most important studies have been selected here for presentation.

In the Pennsylvanian study, Belsky and his colleagues observed 60 middle class mother-child pairs at home. The observations (duration: 45 minutes per measurement) took place in the first, third, and ninth month after birth. A series of maternal behaviors towards the baby were measured, such as maternal responsive vocalization, maternal stimulation/arousal, etc. Infant cry/fuss was also observed. Because a structured observation system was used, interobserver reliability could be computed, which proved to be satisfactory. Scores on nine measures were added to construct a summary measure for reciprocal interaction. Belsky et al. (1984) considered this to be a quantitative measure for responsiveness. Too much or too little reciprocal interaction was seen as unresponsive, and only the middle of the scale as an indication of responsiveness. The validity of this stimulation measure was proved by expected differences between mothers of securely and anxiously attached children. Avoidant attachment appeared to be a consequence of insensitive overstimulation, whereas resistant attachment seemed to be caused by maternal understimulation. The securely attached children had mothers on an intermediate level of stimulation.

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[1] Remark by the authors.

The analysis of the relationship between stimulation, or more specifically the degree of reciprocal interaction, and fuss/cry during the first year of life is of particular interest for our discussion. A cross-lag panel analysis demonstrated that quantity of fuss/cry at an earlier time of measurement did not influence degree of reciprocal interaction at a later time of measurement. The reverse influence, however, could be confirmed. The cross-lag correlations (-.25 and -.32) were significant. The more stimulation, the less babies cry later on. No curvilinearity was found. This result resists easy interpretation. Some form of unresponsiveness, namely understimulation, appears to lead to more crying, but the second type of unresponsiveness, namely overstimulation, leads to less crying! This certainly cannot be called a replication of the results of the Baltimore study. Belsky et al. pointed to the absence of neonatal evaluations; they hypothesize therefore, that a constitutional difference in infant fussiness prior to the first time of measurement could have been the cause of a certain mode of maternal stimulation. This suggestion, however, contradicts the thesis of Bell and Ainsworth (1972), who observed rather little stability of cry/fuss during the first six months and concluded that constitutional differences could not have played an essential role. Belsky et al. (1984) too, found low, non-significant correlations between cry/fuss across points of measurements.

Crockenberg and Smith (1982) did apply the Brazelton neonatal evaluation, and they therefore had data on constitutional irritability differences. Their results showed that these differences have much less weight compared to differences in maternal attitudes towards responsiveness. Their study only covered the first three months. 54 Mother-infant dyads from middle and working class families in which both father and mother were present were involved. The mother had to complete a 34-item questionnaire through which, amongst other variables, responsiveness to crying and flexibility in caregiving were measured. Through factor analysis, a general index of responsiveness/flexibility was constructed. On the fifth and tenth day after birth the NBAS was applied. During the first and third month after birth, the mother-infant dyads were observed at home for about 3.5 hours. A structured observation system was used, for which a satisfactory interobserver reliability could be determined. Observations were notated per ten seconds. Concerning maternal behavior, for example, routine contact, involved contact, eye contact, and intervention time (that is: average number of seconds from onset of crying until mother responds) were measured. Concerning the infant's behavior, for example, cry/fuss (frequency of ten second fuss and cry displays) was observed, as well as average time to calm down after intervention in fuss and cry episodes.

In this study, too, cry/fuss did not appear to be stable across time. The same held true for maternal time to intervene. Through hierarchical multiple regression, the influence of neonatal irritability and maternal characteristics on subsequent infant state (fuss/cry and time to calm) was determined, as well as their influence on maternal responsiveness. In the first month, fuss/cry could not be predicted. Irritability did not constitute a relevant variable in this respect. We believe this constitutes a contradiction to Belsky's abovementioned hypothesis. Fuss/cry in the third month could be predicted by "parity" and maternal attitude towards responsiveness/flexibility. Neonatal irritability and one-month infant state were controlled for. First-born children and children with less responsive and flexible mothers fussed and cried more at three months. Although time to intervene (a behavioral measure for responsiveness) and fuss/cry correlated within time of measurements (.43 and .33), the third month correlation did not survive partializing the maternal attitude variable .

On the basis of these results, Crockenberg and Smith (1982) reflected on the discussion between Ainsworth and Bell (1977) and Gewirtz and Boyd (1977). They agree with the first party in the debate, because they conclude: "... observed fussing and crying is associated *not* with neonatal irritability, but with unresponsive maternal attitudes and behavior" (Crockenberg & Smith, 1982, p.117). We question, however, how far their data justify such a conclusion. Just because maternal behavior in an earlier stage did not influence, at a later stage, the degree of cry/fuss, one cannot speak of a replication of the Bell and Ainsworth results. Maternal *attitudes* towards responsiveness are theoretically, of course, less relevant than maternal responsive behavior. Conditioning theorists, too, would be little interested in the relation between attitudes and child behavior. Such a relation would not be considered a threat to the conditioning view on crying as defended by Gewirtz and Boyd (1977).

From a methodological perspective, the Bielefeld study of Grossmann et al. (1985) may be considered the best replication of the Baltimore study. In discussing this study, we shall only focus on the relationship between responsiveness and cry/fuss. 54 Mother-infant dyads from (lower) middle class families participated in the longitudinal study. First, the NBAS was applied three times in the first few weeks after birth. Thereafter, 49 families were visited at home three times during the baby's first year. In the second, sixth and tenth month, about one hour of the two-hour visit was spent on intensive observation of mother-infant interaction. The visits were audio-recorded. Two observers made notes that were written out afterwards. Thus, the same approach as in the Baltimore study was used. The narrative accounts were coded and infant crying and maternal responsiveness among others was measured. Measurements were made of the number of cry episodes, duration of cry episodes (in categories from very short, 1-5 seconds, to long, more than one minute), maternal responsiveness (in three categories: prompt reaction, delayed reaction and ignoring) and type of maternal reaction to crying, as well as a whole series of other variables. It is not clear whether and how time-markers were used, but considering the categorization of central duration variables this probably would have been done rather globally.

The emphasis of the Bielefeld report is on the results of the observations during the tenth month, but all other points of measurement are taken into consideration. Before the tenth month, a correlation between frequency and duration of infant crying episodes on the one hand, and maternal responsiveness on the other hand, were computed. About half of the mothers never ignored a crying episode, and their children cried significantly less often and for shorter periods of time (Grossmann et al., 1985, p.242). Grossmann et al. do not present a correlation coefficient (parametric nor nonparametric). They rated the mothers on the Ainsworth's sensitivity scale, and concluded that maternal sensitivity correlated negatively with the cry measures: the more sensitivity, the less the babies cried. This correlation only concerns the tenth month observations. Unfortunately, the authors did not present correlations for the first two times of measurement, at least not in Grossmann et al. (1981) and Grossmann et al. (1985). Moreover, the authors did not try to determine through cross-lag correlations the influence of maternal responsiveness in an earlier stage on crying behavior later on. In light of the researchers' intention to replicate design and results of the Baltimore study, a replication of this controversial statistical aspect would have been logical: in principle, relevant data were gathered, but one can doubt the precision and reliability of the frequency and duration measures (see Lamb et al., 1984; 1985). Perhaps some attention will be paid to this topic in future reports.

The fourth study we will briefly discuss here is the cross-sectional study of Landau (1982), done in Israel among five different groups: A middle class and a lower class urban group, a Bedouin group, a Kibbutz group and a group of children from an institution, all participated in the research project. 96 Caregiver-child dyads were involved. Infants were observed in their "natural" environment in their second, fourth, seventh and eleventh month of life. A structured observation system was used, observations were done in half-minute units. The observation sessions lasted about six hours, except with the Bedouin group, which lasted about three hours. Crying and fussing were discriminated: Crying was defined "as a high pitched vocalization of a whining nature, accompanied by tears" (p.434). The same vocalizations without tears were called "fusses". Interobserver reliability was satisfactory.

Results showed a very low frequency of real crying (twenty times less than fussing). The five groups did not differ in crying, and an age effect appeared to be absent as well. In fussing, only the effect of groups did exist: Bedouin, middle- and lower-class groups appeared to fuss more than children from the Kibbutz or the institution. The difference was more pronounced if one only looked at fussing in the presence of familiar people. In that case, most frequent fussing was observed in the Bedouin group and in the lower-class group. Landau supposed these differences to be related to differences in maternal responsiveness. The explicit norm among Bedouin mothers is to intervene promptly if the child starts to fuss or cry. In the lower-class group mothers appeared to spend more time in the presence of the child than the middle-class mothers. In Kibbutzim and institutions, children are reared in groups in which a responsive reaction of the caregivers to crying signals are almost excluded because of the caregiver-child ratio. From these speculations Landau derived the conclusion that "promptly responding to each of the infants' fussing was associated with a higher rate of these responses" (p.439). Such a conclusion, however, cannot be put forward on the basis of a cross-sectional study in which no cross-lag correlations could be computed, and in which the variable "responsiveness" could be determined only in an indirect and probably therefore less valid way.

From the discussion of the four replication studies, we conclude that empirical evidence in favor of Bell and Ainsworth's hypothesis is lacking. In some studies, a synchronous relationship between crying and responsiveness was found (Crockenberg & Smith, 1985;Grossmann et al., 1985). But efforts to replicate the cross-lag correlations of Bell and Ainsworth (1972) have remained fruitless (Belsky et al., 1984; Crockenberg & Smith, 1982). It is remarkable that the relatively high interquarter correlations of the original study (about .50) have not been reproduced yet. The study of Landau (1982) is, of course, not an exact replication, but it shows that the relationship between fussing (in mild forms) and responsiveness may also be contrary to the results of Bell and Ainsworth. Considering the theoretical and practical relevance of the Baltimore cry study, it is very urgent to start new replication projects. The Leiden study will be reported here. Although not all data have been analyzed yet, we think the available material is sufficient for testing the important hypothesis about the relationship between responsiveness and crying.

METHOD

Subjects

Twenty-five autochton families with both mother and father present in The Hague (the Netherlands), who were contacted through midwives (private practice) in the first week after the baby's birth, served as subjects. All infants in the sample were normal, healthy full terms.

Thirteen of the babies were girls; 12 were boys. Sixteen were firstborn children; 9 were secondborns. The social status of the families was assessed by means of the Bernstein method. Mean =5.1 (for a scale ranging from 1 to 10; S=2.3). Five mothers took on a minor part-time job in the second half of the first year (the father or a grandmother took care of the baby when mother was working). The sample could be described as representative of young, lower to middle class families with two parents in which parental and maternal roles were traditionally allocated.

Procedure

Before the start of the data collection, families were visited at home by the project leader and the female observer to brief the parents and to demonstrate the technical equipment. The hypotheses of the study were not revealed. The general development of the baby was made the central issue and the role of the parents was carefully kept out of the spotlight. All subjects were visited at home at three weeks intervals during the first nine months. During the visit, the mother and the infant were normally at home. Visits were scheduled at the mother's convenience, the only restriction being that morning, afternoon and evening observations were needed (unfixed order) to get a representative sample of the baby's crying behavior. Mother-infant pairs were visited regularly by one female observer, except for an occasional joint visit made by two observers for reliability checks. Four regular visitors were required to cover the 25 families. A visit could technically be described as a semi-participational non-interventive data collection session within which an observational session s.s. took place. During the observational session, the observer was obliged to play a low-profile semi-participant role in order to attend continuously to the ongoing stream of behavior recorded with an event recorder. The observational session was started when the baby awoke and ended approximately 5 minutes after the baby fell asleep. Before and after the observation there was ample opportunity for interviews and normal conversation. The mean total duration of the observations for the first quarter was 4.8 hours; s.d.=1.24; Second quarter: 6.5 hours; s.d.=2.38; Third quarter: 8.9 hours; s.d.=2.0). Of course the visits took longer.

Apparatus

The continuous registration of time-related variables such as duration of crying, the time lag between the end of one cry and the onset of another one; the latency of the mother's intervention is not a simple task for one observer in an unstructured natural setting. In order to cope adequately with this complex situation, the use of technical equipment was necessary. An eventrecorder was used to code the mother-infant interactions continuously. At the same time the vocalizations of the baby were recorded with an FM-audio-registration unit. The eventrecorder and the audio-registration unit were synchronized by a time-code generator developed especially for this research project.
An Epson-HX20 portable minicomputer operating on batteries (software basic) served as eventrecorder. The corresponding coding scheme consists of three coding types: contextual codes (3 digits); behavioral codes (6 digits), and system codes (1 or 2 digits). An example of a relevant sequence is shown here in Table 1).

The sequence starts with a contextual code A4E: the baby is actively awake; no caretaking situation, mother is in another room and can hear the baby cry. Interaction episode 1 (E1)

Table 1
An example of coding interactional sequences

Code type	Time table	Code	Behavioral episode
	uu:min:sec		
context	11:15:00	A4E	--
interact.	11:15:00	ic3mbc	E1
"	11:17:30	meric3	E2
"	11:18:00	mcpic3	E3
"	11:20:00	mphic3	E4
context	11:21:00	ACF	--
interact	11:21:00	illmvp	E5

indicates that the baby starts to cry, while mother is busy in the kitchen (ic3mbc); the next episode starts when mother enters the room and the baby still cries (meric3); E3 starts when mother changes the position of the baby (mcpic3); E4: mother picks up/holds the baby, who is still crying; the next code is contextual, indicating the same behavioral state of the baby and close proximity; E5: the baby initiates this episode looking at the mother (crying stops), and the mother vocalizes positively. In this way, the observation session was segmented into interaction episodes dictated by the behavioral changes of the mother or the baby (or both). The time table shows the start of the interaction episodes. The contextual code does not affect the time table. The task of the observer was reduced to accurately coding behavioral changes with a lettercoding scheme designed to facilitate the actual coding itself.

Audio-registration unit

The audio-registration unit contained three components: (1) a wireless FM-transmitter/microphone combination (type Sennheiser SK 1012(MKE 2012); (2) an Uher report 4400 portable stereo taperecorder; (3) a FM receiver (type Sennheiser/Telefunken EM 1008). In order to synchronise the eventrecorder and the audio-registration unit by a time-reference axis, a time-code generator was used to write the time (coded by tone-pulses) on track 1 of the tape recorder. The vocalizations of the baby were recorded on track 2. At the beginning of the visit, the time-code generator was connected with the event-recorder to match the two internal clocks. The audio-registration unit was placed in a stand-by operating mode in the living room out of sight for the mother. The FM transmitter/

microphone combination was placed near the baby (approximately 1 meter). The observer was able to check through earphones in the living room if the baby was awake. When the baby awoke the unit was started and could operate for one hour before the tape was full. In the meantime the observer was able to code the interactions of mother and baby with the portable event-recorder.

The technical equipment was chosen to achieve concrete ends regarding the validity of the data. Under all circumstances it should be possible to register the infant crying without being intrusive. If the baby was crying out of earshot of the observer (often also the mother) it was recorded. If the mother wanted the baby to sleep in the babyroom according to her routines during the observation session, this was possible. The observer then remained in the livingroom, checking through the earphones every five minutes out of earshot of the mother if the baby was still awake. The registration of infant crying did not interfere with the perception of the mother and consequently with possible interventions. So the job of the observer was easier than in the Baltimore study, because of the fact that the timing of relevant events was done by the event-recorder and the time-code generator. Bell and Ainsworth (1972, p.1174) remarked: "... observers in their participant roles sometimes found it impossible to time accurately and hence resorted to estimations". Table 2 shows a comparison of the two data collection procedures.

Table 2
A comparison of datacollection procedures

present study	Baltimore study
continuous direct observation	continuous direct observation
semi-participant non-interventive	semi-participant non-interventive
closed observation system registration: eventrecorder; audio-registration unit	open observation system registration: paper and pencil (narrative report); time indicator

Infant crying

Tape recordings were analyzed with a time decoder which displays the time table recorded during the observation. Given the synchronization of the time table of behavioral episodes (eventrecorder) and the time table of the corresponding taperecording, an effective quantitative analysis of the infant crying and the interventions of the mother was possible taking into account the codings of the observer. Only the sections of the taperecording corresponding with "no proximity situations" in which the baby could have cried out of earshot were listened to in integral form. Six coders analyzed the distress vocalizations. They were initially trained with a record of infant crying (Wasz-Hockert, Lind, Vuorenkoski, Partanen, & Valanné, 1968) In the case of brief isolated sounds, the distinction between distress and non-distress was made by consensus. Disagreements within a pair of observers were coded as non-distress. If the second evaluation by two main coders yielded disagreements, these vocalizations were also removed from the universum of cry sounds. Every distress signal separated by a pause of two seconds from the next crying instance was coded as a crying episode. The onset and end of every crying episode was noted. Bell and Ainsworth defined the central unit measure, namely the crying episode as any instance of a vocal distress signal (protest, fuss or full-blown cry) not too brief to be timed (on the spot)[1], and separated by more than a momentary pause from another instance (1972). This definition was adopted, except for the rather vague and not replicable value of the two parameters involved, minimal duration and time lag between subsequent crying instances. The present study focused on four definitions of this central unit measure as shown in Table 3, in order to check if the results remain invariant under different operationalizations.

Table 3
Four definitions of crying episodes

	Time lag	
min dur[1]	2 sec	4 sec
1 sec	cell 1,2	cell 1,4
5 sec	cell 5,2	cell 5,4

[1] minimal duration

In the section "results" reference will be made to these operationalizations according to the cells.

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[1] remark by the authors

Mother's unresponsiveness

A crying episode was "ignored" by the mother if the intervention started later than 2 seconds after the episode stopped. The duration of mother's unresponsiveness was the difference score between the onset of the intervention and the onset of the crying episode. If a crying episode was ignored, the duration of unresponsiveness equals the length of the crying episode. Maternal interventions were classified as pick-ups, holds; vocalizes; changes position; offers pacifier or toy; removes noxious stimulus; enters room, etcetera.

The focus of this report is on maternal unresponsiveness and not on maternal effectiveness. According to Bell and Ainsworth maternal effectiveness was found to be less powerful than promptness of response in reducing crying in subsequent months.

Reliability

It was difficult to assess the reliability of the observations made by the observers in the home situation, since the presence of one more unfamiliar observer would not be in accordance with the semi-participant non-interventive nature of the data collection by disrupting the normal flow of interaction. Four joint visits were successful. The recording of the infant's crying made it possible to calculate the central measures of crying *post hoc* in such a way that interobserver and intraobserver error variance was eliminated. Thus, the error variance due to measurement on the spot did not play a role, in view of the unpredictable nature of crying behavior. The data for cell 1,2 were coded using a method of consensus, i.e., dropping vocalizations as non-distress if there was any disagreement among coders in a two-stage procedure. Eighty percent of the dropped vocalizations had a duration of less than 5 seconds. A *post hoc* coding of three samples of 20 vocalizations by two coders yielded agreement percentages 85% to 100%, and 70% to 95% against the original codings.

The data of four joint visits provided an indication of the reliability of the mother's unresponsiveness. The onset of verbal interventions available from the taperecorder were excluded, because there is no reliability problem there. The rest of the interventions yielded an agreement score of 82%, 90%, and 95% for the measure "episodes ignored". For the measure "duration of unresponsiveness", the mean deviation score between the two observers was less than one second and 1,5 seconds for the third observation. In all cases the fourth observation yielded onsets of interventions registered on the taperecordings.

Data analysis

The frequency and duration measures for maternal unresponsiveness and infant crying were computed for subsequent quarters and periods of nine weeks in order to obtain stable measures (three for the quarters and four for the periods of nine weeks). Frequency measures and duration measures were analyzed according to Bell and Ainsworth. Frequency measures: % crying episodes ignored by the mother and total number of crying episodes produced by the infant per hour of observation. Duration measures: total duration of the mother's unresponsiveness per hour of observation and total duration of crying per hour of observation. Combining the four operationalizations for the central unity measure (the crying episode) and the two time intervals, eight datasets as shown in Table 4 were analyzed.

Table 4
The eight data sets (combining the definition of the crying episode and time intervals)

Time intervals	Crying episodes defined by the cells			
	cell 1,2	cell 1,4	cell 5,2	cell 5,4
quarters	x	x	x	x
9-weeks	x	x	x	x

RESULTS

Descriptive statistics

Table 5 displays the range, mean, median, and standard deviation for the frequency and duration measures of infant crying, subsequently for the first three quarters. The figures for all four cells (1,2; 1,4; 5,2; 5,4) are shown. Cell 1,2 includes all distress vocalizations and cell 5,2 distress vocalizations with a minimal duration of 5 seconds, etcetera. The mean and median frequency of crying is more or less constant for subsequent quarters. Moreover, the median is very close to the mean, indicating that the distributions are approximately normal. Contrary to the frequency measure, the mean and median duration of crying declines sharply. In the first quarter babies cried (6.5 to 7.2 min./hour) twice as long as in the third quarter (2.7 to 3.2 min./hour). So babies cried in the third quarter as frequently as in the beginning, but for shorter periods of time. This tendency is similar to that reported by Bell and Ainsworth. In the Baltimore sample, the median duration of crying for the first quarter was 7.7 min./hour, and 4.4 min./hour in the fourth quarter. The present study yielded a median of 6.0 to 6.6 min./hour for the first quarter, and 2.7 to 3.4 min./hour for the third quarter. Thus, the Dutch sample is more or less consistent with the Baltimore sample for the central tendency of the duration measures. There is some discrepancy with Grossmann et al.'s data: The mean duration of crying for the fourth quarter was 1.1 min./hour. On the other hand, there is a discrepancy with the Baltimore study for the frequency measures; Bell and Ainsworth reported a median frequency of 4 crying episodes throughout the first year. The most global operationalization of the crying episode (cell 5,4) resulted in a median of 10 episodes per hour (21 for the most refined operationalization). This figure is similar to the Bielefeld sample for the fourth

Table 5
Range, mean, median, and standard deviation for frequency of crying episodes and duration of crying (min./hour) in the first 9 months

	Frequency and duration of crying											
	First quarter				Second quarter				Third quarter			
	max-min	M	me	S	max-min	M	me	S	max-min	M	me	S*
Cell 1,2 frequency	39-5	21	20	7.9	58-6	22	19	12.1	34-4	20	21	8.7
Cell 1,4 frequency	29-5	16	15	6.0	33-4	16	15	8.0	26-3	15	15	6.5
Cell 5,2 frequency	28-3	13	12	5.6	41-3	13	11	8.0	26-1	10	10	6.1
Cell 5,4 frequency	22-3	11	10	4.5	24-3	11	10	5.3	21-1	9	10	4.8
Cell 1,2 duration	24.1-1.0	7.2	6.3	5.1	13.4-.9	5.0	4.0	3.7	7.7-.7	3.2	3.2	1.8
Cell 1,4 duration	15.9-1.0	6.9	6.6	4.2	13.7-.9	5.3	4.3	3.8	8.0-.7	3.4	3.4	1.9
Cell 5,2 duration	15.4-.8	6.5	6.0	4.1	12.9-.8	4.6	3.7	3.6	7.3-.4	2.8	2.7	1.8
Cell 5,4 duration	15.7-1.0	6.8	6.5	4.2	13.4-.8	5.0	4.0	3.7	7.8-.5	3.1	2.8	1.9

* M = mean
me = median
S = standard deviation

quarter (babies cried 10 episodes per hour in the fourth quarter).

Table 6 shows that the distributions of the unresponsiveness measures for the mother also reasonably approach a normal distribution. The mean percentage of episodes ignored by the mother was 40 to 47 for the first quarter, with a strikingly wide range. There is no decline for the central tendency statistics. The range narrows slightly in the third quarter for the cell 1,2 and cell 1,4. The most responsive mother then ignored 6 to 9% of the crying episodes. The duration measure of maternal unresponsiveness declined from a median of 4 min./hour in the first quarter to 2 min./hour in the third quarter.

Bell and Ainsworth reported a similar trend for the central tendency (median) figures, and the absolute figures are also more or less consistent. In the Baltimore sample mothers ignored 46% of the episodes per hour (37% to 47% in the present study) in the first quarter, and 37% in the fourth quarter (38% to 48% in the present study) in the third quarter. The median duration of maternal unresponsiveness was 3.83 min./hour for the first quarter, 2.13 min./hour for the fourth quarter.

Table 6
Range, mean, median, and standard deviation for 'Episodes ignored by the mother' (%), and 'Duration of unresponsiveness' (min./hour) in the first 9 months

	Maternal unresponsiveness											
	First quarter				Second quarter				Third quarter			
	max-min	M	me	S	max-min	M	me	S	max-min	M	me	S*
Cell 1,2 episodes	85-0	47	47	18.7	89-19	52	53	16.7	79-9	48	44	16.3
Cell 1,4 episodes	87-0	44	43	19	86-16	48	48	17	77-6	44	44	17
Cell 5,2 episodes	78-0	44	41	18.7	82-18	49	49	15	83-0	44	44	20
Cell 5,4 episodes	74-0	40	37	17.5	82-18	44	41	15	77-0	39	38	18.8
Cell 1,2 duration	9.9-.9	4.2	4.0	2.4	12.4-2.0	3.6	3.0	3.1	4.3-.4	1.9	1.9	1.0
Cell 1,4 duration	9.9-1.0	4.3	4.3	2.4	12.8-.2	3.8	3.1	3.2	4.5.-.5	2.1	2.0	1.1
Cell 5,2 duration	9.7-.6	4.0	3.6	2.4	11.9-2.0	3.3	2.6	3.0	4.0-.3	1.7	1.7	1.0
Cell 5,4 duration	9.8-.7	4.1	4.0	2.5	12.5-.2	3.7	3.0	3.2	4.3-.4	1.9	1.9	1.1

* M = mean
me = median
S = standard deviation

Stability of crying and unresponsiveness

An indication of the relative stability of individual differences throughout the first nine months for infant measures and maternal measures is provided by the interquarter correlation figures. We are aware of the pitfalls regarding this procedure but the size of the sample did not allow for any form of panel analysis.

Table 7 shows the interquarter correlation (Pearson product moment) matrices for frequency of crying and duration of crying based on cell 1,4. Similar results were found for the other cells.

It seems that in the first half of the year, crying behavior is more or less stable, but crying behavior in the third quarter is not predictable from the information about the first half year. At this point there is some discrepancy with the Bell and Ainsworth report. The Baltimore study yielded only a significant rank order correlation between the third and fourth quarters. Nevertheless, the results of the present study point to a lack (or at most marginal effects) of possible *constitutional differences in crying.*

Table 7

Correlations between cry variables measured in three quarters (*n*=25)

	frequency of crying		duration of crying	
Quarter	2	3	2	3
1	.63*	.20	.74*	.14
2		.25		.27

* *p* <.001

Table 8 shows the interquarter correlations for episodes ignored and duration of unresponsiveness (based on cell 1,4). For the *frequency measure* the correlations between the first and second quarter and the second and third quarter respectively are significant. For the other cells, only *the first correlation* was significant. The duration of unresponsiveness seems only stable for the first half year.

Bell and Ainsworth reported stable maternal tendencies throughout the year for responding to crying (probably influenced by the mother's personality) based on interquarter bivariate correlations.

Table 8
Correlations between unresponsiveness variables measured in three quarters (n=25)

	Episodes ignored		Duration of unresponsiveness	
Quarter	2	3	2	3
1	.54**	.10	.70***	.10
2		.34*		.19

* $p < .05$
** $p < .01$
*** $p < .001$

Infant crying and maternal unresponsiveness

First, bivariate correlations were computed for maternal unresponsiveness and infant crying. Given the hypothesis that the behavior of the mother in a certain period of time is an important pedagogical determinant (independent variable) for infant crying in subsequent periods (dependent variable), a selection of possible correlation indices were inspected. Table 9 shows the rank order correlations (Spearman's Rho) for the frequency measures, based on cell 5.2

All other cells yielded non-significant coefficients. The tentative interpretation of Table 9 is that mothers who ignored more episodes of crying in the first quarter tend to see their babies cry less frequently in the second quarter. The results are similar for the period of nine weeks, also for the relationship between the second and the third period.

Contrary to the frequency measures found less important by Ainsworth and Bell (1972, p.245), the bivariate correlation for the duration measures was significantly positive for the first and second quarter (see Table 10).

On the basis of similar positive correlations throughout the whole year, Bell and Ainsworth (1972) concluded that those mothers tending to give a more delayed response in one quarter, would see their baby cry more in the next one. This incorrect conclusion based on spurious correlations would apply only for the first half year for the present study, because the correlation between the second and the third quarter was positive, but not significant. The uncorrected measures yielded a substantially high correlation (.94) within the second quarter. Measures were not artificially corrected for intra-quarter relationships, because this correction does not make

Table 9
Spearman correlations between number of episodes ignored by the mother and frequency of crying (n=25)

Episodes ignored by mother	Frequency of crying (cell 5,2)				
	2nd quarter	3rd quarter	2nd 9 wks	3rd 9 wks	4th 9 wks
First quarter	-.33*	-.07			
Second quarter		-.04			
First 9 weeks			-.33*	-.36*	-.08
Second 9 weeks				.09	-.12
Third 9 weeks					-.15

* $p <.05$

any sense (cf. Gewirtz & Boyd, 1977; Ainsworth & Bell, 1977). There is a basic interdependence between infant and maternal measures. However, controlling for intra-quarter maternal duration of unresponsiveness addresses the criticism of a synchrone concurrent variable (Gewirtz & Boyd, 1977). Partialling out the unresponsiveness of the mother resolved the positive relationship immediately. Similar results were found for all cells. The conclusion cannot be any other than that the results of Bell and Ainsworth's sample for the duration measures were found without partialling and were not found by controlling for a synchrone concurrent variable for the first half year. The results for the periods of nine weeks are consistent throughout the period of 27 weeks (= half a year). Only for cell 5,2 and cell 5,4 was the inter-period correlation between the second and the third period not significant, but the overall tendency was positive. For the period of nine weeks the partial correlation became even significantly negative, quite a radical change. This strikingly unexpected result indicates that mothers who tend to be more unresponsive in a certain period of time have babies who cry less in a subsequent period. This interpretation seemed to contradict the Baltimore study and is consistent with the findings of Landau (1982) and Moss (1972). Before jumping to conclusions it seems appropriate to seriously scrutinize the criticism of Gewirtz and Boyd. They justifiably stated that not only synchrone concurrent variables were ignored by Bell and Ainsworth, but antecedent concurrent variables as well (Gewirtz & Boyd, 1977). The most important antecedent variable is the crying behavior of the baby in a preceding period. Given the

Table 10
Product moment correlations between duration of maternal unresponsiveness and duration of crying (n=25)

Duration of unresponsiveness	Duration of crying (cell 5,2)				
	2nd quarter	3rd quarter	2nd 9 wks	3rd 9 wks	4th 9 wks
1st quarter	.64*(.06)[1]	.17			
2nd quarter	.94*	.28(.10)			
1st 9 wks			.65*(-.51*)	.50*	-.05
2nd 9 wks			.97*	.34(-.11)	.00
3rd 9 wks			.37	.97*	.10(.03)

* $p < .01$

[1] in brackets: partial correlations, controlled for second quarter, etc.

small sample size (*n*=25), the antecedent variable was controlled for artificially by regarding the change in crying behavior in subsequent periods or quarters as the dependent variable. A cross-lag panel analysis based on latent structural equation analysis is not statistically justified (Boomsma, 1982). The change in crying behavior was defined as the quotient of the difference score between two periods and the score in the preceding period. This variable resembles the development of the durational or frequency measure, incorporating initial differences between infants. If crying behavior changes more or less to the same degree within the sample, the correlation between this variable and the predictor variable should not be found significant. Individual scores will be positive as infant crying undergoes relative increases, and negative in the case of a decrease. We are aware that the difference score as a measure for change in the case of a multiple operationalization of a construct could be criticized (Lewis, 1985). This variable, however, has predominantly concrete features, so that, given the accuracy of the measurement procedure, measurement at two successive points is not invalidated by regular pitfalls.

Table 11 shows the correlation matrix of the variable "change in crying behavior" with mother's unresponsiveness for preceding periods partialling out the responsiveness in the synchrone quarter. These partial correlations are based on cell 5,2.

Table 11
Product moment correlations between duration of maternal unresponsiveness and change of duration of crying in the next period or quarter (n=25)

Duration of maternal unresponsiveness	Change of duration of crying (cell 5,2)				
	2nd quarter	3rd quarter	2nd 9 wks	3rd 9 wks	4th 9 wks
First quarter (contr. for second quarter)	-.81*	n.s.[1]			
Second quarter (contr. for third quarter)		-.53*			
First 9 weeks (contr. for second 9 weeks)			-.51*	n.s.	n.s.
Second 9 weeks (contr. for third 9 weeks)				-.47*	n.s.[2]
Third 9 weeks (contr. for fourth 9 weeks					-.45*

* $p <.01$
[1] not significant
[2] controlling for the fourth nine weeks

The partial correlations are substantially negative. The results are similar for all other cells, based on quarters or periods of nine weeks. Findings were consistent for duration measures and frequency measures. Thus, this finding is very stable and conservative. It is interesting to note that controlling only for the synchrone concurrent variable yielded no relationship between maternal duration of unresponsiveness and duration of crying (cfr. Ainsworth & Bell, 1977; referring to a reanalysis of their data by Gewirtz & Boyd for the quarters). Further controlling for the antecedent concurrent variables resulted in a negative relationship. The results could then be described as an empirical basis for the conclusion that mothers who tend to delay a response more in a certain period had babies who cried less frequently and shorter in subsequent periods. This conclusion contradicts the findings of Bell and Ainsworth.

CONCLUSIONS

In the introduction of this chapter, we stressed the important role of the Baltimore study in radicalizing the attachment theoretical ideas concerning the relationship between responsiveness and crying. Initially, crying was sophistically conceived as a graded signal to which different meanings could be attributed depending on intensity, temporal structure and context. In the period following the Baltimore study, crying became an undifferentiated, on/off signal to which the caregiver(s) should always respond as quickly as possible (except on very rare occasions when responding is obviously inappropriate).

Being familiar with the studies by Wolff (1969), Bowlby (1971) was aware of the fact that not all crying behavior is a signal of fear or a call for proximity. One could argue that only full-blown crying with a strident nature (severe distress because of pain, existential fear), should be unequivocally conceptualized as attachment behavior, with evolutionary origins. For milder forms of distress vocalizations (whimpering, fussing), this is not self-evident. This also implies a differential response of the caregiver(s): a fixed response pattern promoting proximity to the baby in case of a compelling form of crying (i.e., a cry with a long expiration pause), and a variable, contextually defined response pattern given forms of a mild distress vocalization.

The striking (but probably false) results of the Baltimore study tempted Bell and Ainsworth (1972) to classify all crying behavior as attachment behavior and to stipulate that responsiveness is predominantly a promptness of response, without taking into account the quality of the response, such as adequacy (Lamb & Easterbrooks, 1981). They justified this point of view by referring to their empirical findings that promptness of response was found to be more effective in reducing crying in subsequent months than maternal effectiveness in terminating crying. We have outlined the Baltimore study in the preceding paragraphs and referred to criticisms by Gewirtz and Boyd (1977) and Lamb et al. (1985). Despite the fact that Ainsworth and Bell (1977) admitted the non-conclusive nature of their study and emphasized the urgency of replication, the first research project covering the Baltimore study has yet to be reported. Research by Belsky et al. (1984), Grossmann et al. (1985), Crockenberg and Smith (1982) and Landau (1982), did not replicate the Baltimore study, and the results are not congruent.

What is needed is a critical replication study directly recording the measures for infant crying, and preserving the intensive naturalistic longitudinal aspects of the study. However, at the same time it should aim at more refined registration procedures and statistically justifiable analyses.

The present study is such an effort. The results are more or less convergent regarding univariate descriptive statistics for the two samples. Similar findings were repeated for bivariate interquarter correlations for duration of maternal unresponsiveness and duration of infant crying for the first half year. In other words, positive significant bivariate correlations were found similar to those on which Bell and Ainsworth based their conclusions. Had synchrone and antecedent concurrent variables not been controlled for in this study, one could (falsely) conclude that a relatively longer duration of the mother's unresponsiveness in the first quarter covaried with a longer duration of crying in the second quarter. Controlling for antecedent and synchrone concurrent variables revealed that the observed relationship was due to spurious correlations. The relationship proved to be quite the opposite when a stable picture of negative partial correlations was unfolded, leading to the conclusion that there is an inverse relation between the mothers' unresponsiveness and infant crying. Moreover, this pattern of negative correlations proved to be consistent for all possible operationalizations used in this study, indicating some robustness or conservativeness of these findings. The data indicated that mothers who tend to delay their response relatively longer effected a decrease in infant crying for the next period or quarter.

How should one interpret this unexpected result? For the development of infant cry/fuss in the first year, at least three models are relevant. The *organistic* model stresses the predominant effect of initial constitutional differences in irritability. The data of the present study suggest that in the first half year, individual differences in crying behavior are relatively stable given the inter-quarter correlations. This suggestion is merely tentative but nevertheless this model is inadequate to explain the rest of the reported results. Research concerning the irritability factor revealed minor effects of this factor (Crockenberg & Smith, 1982; Grossmann et al., 1984), and generally speaking the relationship between mother-infant interaction and constitutional factors, i.e., temperament, is still very confusing (Sroufe, 1985). To postulate that fussiness has nothing to do with mothering (as was done by Belsky et al., 1984, p.727) is not very plausible. This model simply does not fit the results of the present study regarding the covariation of maternal unresponsiveness and crying.

A second model is the *conditioning* paradigm. Gewirtz (1961) made some efforts to demonstrate experimentally that mother and infant reinforce each other's behavior differentially, and so acquire mutual control of one another, or develop something resembling a form of attachment. An evolutionary component was regarded as redundant. Bowlby (1971) did remark that nothing whatsoever in the conditioning approach "contradicts the view advanced here (but) it tends to give too little attention to the strong innate biases that, it is held, each partner brings to the partnership" (p.266). These innate biases should not be overlooked as this may result in falsely construing every behavioral system as environmentally unstable (cf. Ainsworth, 1973). As Bowlby would say, we cannot do whatever we want with our biological inheritance. This point of view has been taken seriously by Petrovich and Gewirtz (1985). The conditioning theory as the theory of proximate causes was complemented with evolutionary reflections about ultimate causes, being very similar to reasoning in an attachment-theoretical framework (cf. Lamb et al., 1985). Attachment behavior is linked to the expansion of inclusive fitness by upgrading the reproductive success of the individual. This is the evolutionary basis for developing complex forms of "psychobiological attunement" (Field, 1985) between babies and parents: "simply stated, the greater the number of genes shared, the greater the probability of dyadic interactions indicative of affect, attachment, and/ or attunement", as stated by Petrovich and Gewirtz (1985, p.235). The difference between this revised conditioning theory of attachment and the Bowlbian theory seems to be the use of the conditioning paradigm for the description of the proximate causes for attachment as suggested by Petrovich and Gewirtz (1985, p. 276). However, this suggestion is incorrect, because Bowlby (1971, p.374) obviously leaves room for reinforcement of behavior by conditioning, i.e., feedback on certain behaviors of the child by a responsive caregiver. This learning mechanism undoubtedly has a place along with other "causes" for the development of attachment, such as an built-in bias and "exposure learning" (p.374). It is clear that conditioning theory in its most recent terms cannot be considered incompatible with the attachment theory.

It is tempting to interpret the inverse relationship between unresponsiveness and infant crying as the result of an extinction mechanism due to a lack of reinforcement given by the mother. But this interpretation does not adequately account for the evolutionary origins of behavior, i.e., crying behavior as conceived by the revised conditioning theory.

Bowlby and Ainsworth stated very plausibly in their attachment theory that crying behavior had fulfilled a role in the evolution of the species by promoting proximity of a protecting companion to a helpless baby. It seemed that this role, however, is fulfilled by an unequivocally interpretable form of crying, calling for or inducing an equally unequivocal reaction (Murray, 1979). This should be a form of crying indicating severe distress (e.g., crying with long expiration pauses, etc.). Viewed from an evolutionary perspective, there is only one adequate response and this is bridging the distance and eliminating or changing the conditions that caused the crying behavior. Babies who fail to get an adequate response will emit an alarming vocal signal in the case of declining threshold values of distress. In the case of milder forms of distress vocalizations the situation is different to the former one described. The evolutionary role of this form of crying behavior is less obvious, and the information to the caregiver is not clear cut. The question remains if a delayed response of the caregiver does not enable the infant to cope with the mild distress by itself (cf. Landau, 1982). This would result after a while in a reduction of fussing behavior; "this might happen because being able to cope under such conditions will make the situations less stressful in the future" (Landau, 1982, p.441). This seems to be an accurate description of the behavior of a responsive mother, also in the Baltimore study: "Even the most responsive mothers did not respond to a little cry that stopped spontaneously when a baby was put to sleep or a similar brief fuss when a baby was trying to turn over and could not manage by itself, however, succeeding next. But rarely did they fail to respond to a loud and prolonged cry" (Ainsworth, personal communication; Landau, 1982, p.440).

Although in the present study different types of crying were not analyzed separately, we have the impression that less than 20% were vocalizations indicating severe distress. Given the thesis that only severe distress vocalizations should be conceptualized as attachment behavior, one might infer that an explanation in terms of conditioning could be relevant. This does not imply that alone ignoring fussing behavior is adequate, but also responsive reactions to behaviors that are concurrent with crying, such as smiling, exploration, etc. (cf. Etzel & Gewirtz, 1967). Responsive reactions during a calm state that tends to turn into crying might be a better - indirect - intervention against excessive crying behavior than any form of negative reinforcement to fuss/cry (cf. Fouts, 1974; Lester, 1985, p.25). Thompson and Lamb (1983) criticized research regarding crying as a simple on/off signal. Mild whimpering, fussing, angry protest, sobbing and hyper-ventilated crying or screaming should not be confounded. They advocate the conceptualization of crying as a differential or graded signal. On the basis of this present study, we suggest that responsiveness, too, is falsely conceived of as an on/off signal. We would suggest the term *differential responsiveness*: Given the intensity and temporal structure of crying, a delayed or *prompt* response is adequate. In accordance with the hypothesis of differential responsiveness it is relevant to react promptly to alarm signals. These signals are seen as authentic attachment behavior with the function of bridging the distance to a caretaking or protective companion. The adequate answer is a prompt reaction aiming at proximity and a change in the conditions that cause the emittence of the alarm signal. Further responsiveness is relevant for behaviors which are concurrent with crying, i.e., smiling and exploration. If a calm state tends to shift to fuss or cry, then a responsive intervention can continue this state and prevent crying. In such a way the baby also develops a sense of controlling and influencing the environment. Responsiveness is correctly regarded in the attachment theory as relevant for developing a feeling of competence. The present study, however, demonstrated that a mere prompt response of the mother to all forms of cry/fuss could turn out to be counter-productive. One should be aware of the fact that prompt reactions of the mother reinforced fussing behavior. The notion of differential responsiveness implies that given milder forms of fussing, a (positive) disposition towards delayed reaction is adequate, for this form of crying does not appear to have evolutionary origins in a strict sense.

This interpretation could be strengthened by pointing to the inclusive fitness variant of an ultimate explanation of attachment (Lamb et al., 1985). In this variant the caregivers aim at maximalization of reproductive success. This could imply that they do not react responsively to certain behaviors of a baby in specified contexts, because a reaction is not in keeping with the well-being of other offspring. Parental attention should in general be divided between several children and it is not plausible to assume that evolution compelled parents to respond to every cry/fuss if they do not wish to disfavor the other offspring. Hinde (1982) suggested that it is not according to reason to assume that evolution has culminated in a uniform type of mother-child interaction. Babies who are insensitive to temporal unresponsiveness because their siblings needed attention are perhaps well-equipped in terms of fitness in the struggle for life.

So the hypothesis of differential responsiveness implies that maternal unresponsiveness has an increasing effect on severe distress vocalizations and a declining effect on mild forms of distress vocalizations. This notion is coherent within the context of a sophisticated attachment theory as outlined by Bowlby. The relationship between unresponsiveness and crying is hypothetical because this critical replication study yielded one obvious result by falsifying the thesis of Bell and Ainsworth (1972) that consistent promptness of response tends to decrease an infant's readiness to use crying as a signal (p.1180). The statement may mean that one should respond differently to different forms of crying. The present study did not differentiate between severe distress vocalizations and mild distress vocalizations. Consequently, the hypothesis about a complex relation between unresponsiveness and crying was formulated, in accordance with Bowlby and Wolff.

The present study does not permit the conclusion that one of the cornerstones of the attachment theory should as yet be considered falsified. Referring to the original formulations of the attachment theory by Bowlby, the radical interpretation of Bell and Ainsworth should be dropped, although the generalization of these results is limited to the universum of *non severe distress vocalizations*. These results do not apply to other signals of the baby. Further research concerning the relation between different forms of cry/fuss and responsiveness, e.g., with the Thompson and Lamb scale (1982), is necessary to test the hypothesis of differential responsiveness. The reactions of the caregivers to positive signals of the baby, i.e., signals preceding crying behavior, is very important in this context. Perhaps one should then conclude that a high grade of responsiveness can prevent crying but does not reduce crying once it has started.

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Part Four

THE STRANGE SITUATION: A MULTINATIONAL DATA-SET

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ATTACHMENT IN SOCIAL NETWORKS
L.W.C. Tavecchio and M.H. van IJzendoorn (editors)
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CHAPTER 10

EXPLORING CHILDREN'S BEHAVIOR IN THE STRANGE SITUATION

Pieter M. Kroonenberg and Marinus H. van IJzendoorn

ABSTRACT

Using data from six different countries but disregarding nationality, an analysis was made of the behavior of children and of subgroups of children in the Strange Situation. Employing three-mode principal component analysis, trends in behavior were studied both for the Mother episodes, and for the Strange episodes separately, and for most episodes jointly. With continuous components, like Proximal Behavior, Distal Behavior, Resistant Behavior, and Stranger Anxiety, compact descriptions could be given of the behavior, both in terms of idealized individuals and as members of the subgroups of Ainsworth' classification system. The rather complex patterns of avoidance towards the mother were studied and commented upon. Details are presented on the development of these components over the episodes. It was also shown that the components succeed to a reasonable degree to separate the subgroups.

INTRODUCTION

There is a striking contrast between the intricacy of data collection procedures of the Strange Situation and the simplicity of its analysis and reported results. In this chapter we will show how more detailed analyses of the Strange Situation are possible, and how much more is happening than is customarily reported.

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In the Strange Situation, a child is confronted with a stressful situation which is divided into a complex series of episodes. Within twenty minutes it has to deal with a) a strange environment; b) a stranger who tries to engage it in playful interaction but leaves quite suddenly; c) the rather strange behavior of the mother who leaves and returns again several times. The Strange Situation does not seem to be similar to any of the child's known and trusted situations; even during the visit to the pediatrician the mother stays at its side. Therefore, it is not surprising that children are under stress and show very intense feelings and emotions (cf. Gaensbauer, Connell, & Schultz, 1983). The intensity of these emotions could be the reason that children express so much of themselves in the Strange Situation.

The children's behavior can be scored in all episodes on a number of scales and variables. Ainsworth, Blehar, Waters, and Wall (1978) presented more than one hundred scores per child: about 70 scores on frequency measures such as exploratory manipulation, exploratory locomotion, visual exploration, crying, smiling, vocalization, looking, etc., and about 38 scores on interactive scales such as proximity seeking, contact maintaining, distance interaction, search, resistance and avoidance. The richness of Strange Situation data is very impressive indeed. However, only a very limited part of this richness appears to be used in its analysis. Reduction is the most important characteristic of coding the data. First, the multitude of data per child is reduced to eight subcategories into one of which each child is assigned. In fact, on the basis of the more than one hundred scores the child is rated as having an A1, A2, B1, B2, B3, B4, C1, or C2 type of attachment relationship with its caregiver. Because samples of most studies are too small and children are too unequally distributed among the eight subcategories for sophisticated statistical analyses, the subcategories are often reduced to the three main categories: A, B and C types of attachment. Finally, the ultimate reduction takes place when, supposedly to increase the power of the analyses, the A- and C-categories are lumped together. The plurality of attachment relationships is then reduced to a simple dichotomy: anxious versus secure relationships. Thus, the original richness of data culminates in assigning each child to one of two categories through which "reality" is supposed to be described.

Although system theory can be used to defend the necessity of combining behaviors with the same function into higher levels of aggregation (Van IJzendoorn & Tavecchio, chapter 1, this volume), this extreme reduction obviously leads to the question whether the indirect way, using more than one hundred variables to reach a dichotomous decision about a child, could not be dispensed with. It is not unusual, therefore, to utilize only scores on the interactive scales in the two reunion episodes (4 and 7) to classify children. Furthermore, only scores on two scales appear to be critical, namely avoidance and resistance. When a child clearly avoids its mother in the two reunion episodes their relationship has to be classified as an A type. Similarly, considerable resistance determines a C type of attachment. In fact, the exclusive use of the reunion episodes seems to have more statistical rationale than a classification using all Strange Situation data. In particular, Ainsworth et al. (1978) showed that the interactive scales in the two reunion episodes have sizeable weights in the discriminant functions differentiating between A, B and C type relationships. If we make use of a mere six minutes of the Strange Situation, the question arises which information the other episodes contain. Is it possible to derive other dimensions than security of attachment from this material, or is the information completely redundant compared to the classification?

The reduction of information from the Strange Situation has led to much dissatisfaction with the A-B-C classification. Four important criticisms have been brought forward. First, the fundamental comment has been made that a simple dichotomization or trichotomization of the Strange Situation data takes only one aspect (security of attachment) into account, and neglects other relevant data and aspects (Connell & Goldsmith, 1982). Secondly, there is no clear-cut algorithm to transform the continuous variables into discrete categories; therefore, some error variance due to coding biases is unvoluntarily added to the imprecise scoring of the continuous variables. Clinical insights seem to play an indispensable role in attachment classifications, and serious proposals for classification formulas have not yet been put forward. This implies that it is not exactly known what kind of information is lost (or is added!) by "clinically" classifying the children on the basis of the scales. Although Connell (1977) tried to develop an "objective classifier" (p.126) based, among other things, on discriminant analysis of Ainsworth's data, his proposal has not been applied on a wide scale. Because Connell deleted the marginal groups B1 and B4 from his sample, the "classifier" cannot have but very restricted validity (cf. Lamb, Thompson, Gardner, & Charnov, 1985, p.135). Thirdly, ethology does not seem to suggest that natural selection would prefer a discrete instead of a continuous reality (Lamb et al., 1985). Describing reality with a limited number of categories is especially functional and effective in the theoretical discourse, in which typologies are constructed to represent as much information as is possible. We always have to bear in mind, however, that such typologies are indeed constructions that have to be changed if they appear to distort our perception of reality. Fourthly, there is a technical criticism. Discrete variables are much more difficult to handle in multivariate statistical analysis than continuous variables. One way to solve this technical problem is by using the continuous interactive scales as well as the attachment classifications in analyzing the data (see, for example, Van IJzendoorn, Van der Veer, & Van Vliet-Visser, chapter 5, this volume). Recently, an intuitive scaling of the subcategories has been used to construct a continuous variable. B3 children are given a score of 3; B1, B2 and B4 children receive a score of 2; and A and C children are given a score of 1. The resulting alleged continuous variable has been called "security of attachment" (Main, Kaplan, & Cassidy, 1985, p.82), but a theoretically sound rationale seems to be lacking, and it has not yet been shown that the variable is indeed a continuous one.

We think the above mentioned criticisms cannot be refuted by referring to studies done in the past. A thorough study of the Strange Situation is necessary to solve the problems more fundamentally. The dimensions underlying all variables have to be analyzed in relation to the classification, as well as the dynamics over different episodes. Different approaches have already been tried out. Discriminant analysis has been applied by D.B. Connell (1977), Ainsworth et al. (1978) and Lamb et al. (1985) to find out which combination of variables maximizes the difference between the categories, given the classifications. The A, B, and C classification appears to be reproduced rather well by this procedure. In addition, nonlinear mapping (Connell, 1977) and cluster analysis (Lamb et al., 1985) have been applied to try and identify groups of children given the variables but not the classifications. The pertinent question was whether the discovered clusters are similar to the A, B, C groups. The results are somewhat disappointing: The most important dimension which distinguished between the clusters is the proximity versus distance interaction dimension. This dimension is, of course, not identical to the security-of-attachment dimension (Lamb et al., 1985, p.217). Connell's nonlinear mapping showed the similarity of B1 to A children, and the marginal C-like status of the few B4 children in his sample. The groupings of A and C children did not show any overlap (Connell, 1977, p.136). Connell's dimensions could globally be typified as "distance/avoidance versus proximity/contact maintaining", and as "antithetical versus thetical attachment behavior" (resistance/avoidance versus proximity) (p.135). Finally, analysis of covariance structures has been applied (Connell & Goldsmith, 1982; Connell, 1985). Not only the influence of behavior in earlier episodes on behavior in later episodes was studied (Connell & Goldsmith, 1982), but "fundamental components" in the Strange Situation data have been derived as well (Connell, 1985). The problem with the latter analysis is the large number of dimensions, and separate analyses of the components in variables, episodes and subjects, so that changes over episodes are not combined with the components of the variables. The "structural modelling approach" of Connell and Goldsmith (1982) combines the search for underlying dimensions and their dynamics over episodes, but the small sample size (n=55) confers only a hypothetical status to the results (see Boomsma, 1983, for a discussion of the necessary sample sizes in this type of analyses). Furthermore, Connell and Goldsmith only studied the influence of the first separation episode on the first reunion episode. This is, of course, only a small part of the "mini-longitudinal" design of the Strange Situation.

In this chapter we hope to arrive at an integrated solution by applying three-mode principal component analysis. It is not suggested that this approach is the only suitable one for this purpose, but it is contended that it is an extremely flexible and powerful one. By applying three-mode principal component analysis we try to answer the question whether "a discrete number of continuous variables that represent meaningful individual differences in Strange Situation behavior" (Lamb et al., 1985, p.222) can be developed, and how these variables or dimensions relate to the classical A-B-C classification. By searching for components not only in variables but also in episodes and subjects, we hope to shed some light on the dynamics of the entire Strange Situation.

As has been said above, our main tool in the exploration will be three-mode principal component analysis (see e.g., Tucker, 1966, 1972; Kroonenberg & De Leeuw, 1980; Kroonenberg, 1983, 1984, in press; Snyder, 1986, and Appendix A). In two previous studies we have used the same method to study Strange Situation behavior (Kroonenberg, 1984; Van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1985). The first study used preliminary data which later were corrected in many ways (Goossens, 1986). Therefore, that study should primarily be seen as a methodological exercise in three-mode principal component analysis rather than a substantive contribution to the theory of attachment. In the second study the now corrected data were analyzed, but the reporting was extremely compact and hardly suitable for showing the full power of the technique in unravelling and describing the behavior in the Strange Situation in great detail. The present study attempts to combine both methodological and substantive aspects. It will at the same time be more general, and more restricted than the previous studies. It is more general because data are available from six countries rather than one (Germany, Israel, Japan, the Netherlands, Sweden and the United States - for a detailed description see Sagi & Lewkowicz, chapter 11, this volume; and Appendix B); it is more restricted because in contrast with the Van IJzendoorn et al. (1985) study, no information is available on the variables crying and exploratory manipulation. The multinational origin of the data has important consequences for our ability to analyze the Strange Situation with respect to the attachment subgroups. The distribution over subgroups is different in all countries: for instance, relatively more C children in Israel, more B1 children in the Netherlands, etc. (see again Sagi & Lewkowicz, chapter 11, this volume; Table 1). Therefore, almost all subcategories of the classification are represented with enough subjects to allow the multivariate study of differences and similarities between the subgroups (for details on the data and their preparation for analysis, see Appendix B).

In this study we will disregard the different countries of origin of the children. Possible differences in scoring procedures between countries will be considered as differences caused by or allowed by the scoring and classification procedures. Researchers in all countries have checked their procedures against one or more colleagues in other countries so that we may assume that in principle all investigators use largely a common approach to scoring. In as far as they do not, this should be seen as a fault of insufficiently restrictive instructions, rather than "caused" by the researchers' nationality. Similarly, differences in distributions over the subgroups will be considered genuine "cultural" differences rather than instrumental ones. In the same spirit, age differences will not be considered, nor could they be as they are not part of the data base. From the original publications (Sagi, Lamb, Lewkowicz, Shoham, Dvir, & Estes, 1985; Miyake, Chen, & Campos, 1985; Van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1984; Goossens, 1986; Beller & Pohl, 1986; Lamb, Hwang, Frodi, & Frodi, 1982; Belsky, Rovine, & Taylor, 1984; Thompson, 1981), it can be inferred that the ages vary between 12 months and 24 months. The Dutch sample in particular has a disproportionate number of older children. It should be realized, however, that generally the Strange Situation is considered applicable for all children in the stated age range (Lamb et al., 1985, p.31), be it that especially older children score higher on proximity seeking and distance interaction due to their greater mobility and communicative skills (for reviews see Lamb et al., 1985; Goossens, Van IJzendoorn, Tavecchio, & Kroonenberg, 1986).

ANALYSIS PLAN

The simplest way to describe the dynamics of behavior in the Strange Situation is to show how the means (and standard deviations) change on the interactive scales or variables - proximity seeking (P), contact maintaining (C), resistance (R), avoidance (A), distance interaction (D), and search behavior for the mother (S) - per subgroup over the episodes. The episodes will be designated by a letter and a number, i.e., M1, M2, S2, S3, M4, A5, S6, M7, indicating the number of the episode (following Lamb's system of counting), and the person present, i.e., Mother (M), Stranger (S), and the child alone (A). In Episode 2 behavior of the child towards both the mother and the stranger is scored.

Starting from the assumption that interactive behavior towards the mother is functionally different from that towards the stranger, a fundamental difficulty in analyzing the behavior of a child in the Strange Situation is that in each episode, except for the second one, scores are only available on half of the variables. In particular, in S2, S3, S6 scores are available on Ps, Cs, Rs, As, Ds, and S (no search, however in S2 due to presence of mother), while in M1, M2, M4, and M7 scores are available on Pm, Cm, Rm, Am, and Dm. Finally, in A5 a score is only available for search.

There are several ways to treat this problem. A very common one is to ignore the sequential character of the data and analyze them as 38 stochastically independent (and not autocorrelated) variables. Another frequent procedure is to ignore the stranger and average the M4 and M7 scores. In one of our previous studies (Kroonenberg, 1984) the problem was solved by equating Ps and Pm, Cs and Cm, etc. But as stated in Van IJzendoorn et al. (1985) this is not really satisfactory because of the possible differences in meaning and function between behavior towards the stranger and towards the mother. In Van IJzendoorn et al. (1985) we analyzed S3, M4, S6 and M7 simultaneously by creating two "phases", one of the variables in S3+M4, and one of those in S6+M7, while in preliminary (but not reported) analyses we also added a phase S2+M2 (without search behavior). In this way we managed to analyze behavior towards the mother and the stranger together, while also allowing for the sequential or temporal aspect.

In the present study we have taken two approaches towards studying the development of behavior over time. In the first place we analyse separately the behavior towards the mother, i.e., M1, M2, M4, and M7, and that towards the stranger, i.e., S2, S3, and S6. Secondly, we used the phases approach by examining S3+M4, and S6+M7. In all analyses involving episode 2, it should be remembered that there is the difficulty that certain behaviors are mutually exclusive. A child is not likely to have a high score on contact maintaining both towards the mother and the stranger simultaneously, while this is quite possible for distance interaction. To what extent this is a problem has to our knowledge never been investigated. We, too, will not enter into such an analysis, and we hope and expect that the problem is not very serious. One of the reasons for this is that most children do not have high scores in this episode, and another is that the use of rating scales rather than frequency measures alleviates some of the dependence.

So far we have only looked at ways to treat variables and episodes, but we have not yet considered the subjects themselves. An implicit assumption in most approaches attempting to analyze dependence between variables is that subjects are random samples from certain populations, and that these samples or populations are sufficiently homogeneous to make computing averages and correlations sensible. Often by computing correlations or covariances, the subjects are "removed" from the analyses, and they only serve to assess the variability of the estimates of the variable dependence. From the literature on attachment, however, it is known that subgroups exist, even if it is not fully explored to what extent they induce a different correlational structure on the variables. If the groups share the same structure, possibly to a different degree, treating the children as replications is not a problem; if they do not, then attention should be paid to such differences. One of the virtues of three-mode principal component analysis is that many kinds of differences in structure can be accommodated and investigated along with the temporal aspects of the situation as well. And if there are children that do not fit the model determined by the majority, they can be spotted.

MEANS

The simplest way to get a first view of the development of the children's behavior in the Strange Situation is to inspect the trends in the means of each variable over the episodes.

In Figure 1, these means are portrayed, separately for the mother episodes (M1, M2, M4, M7) and the stranger episodes (S2, S3, S6). As the scale is the same for all figures, comparisons can also be made across variables assuming that the scoring of behavior is such that the intensities may be compared. Even though the means of the subgroups are plotted in Figure 1 our main concern is with the variables themselves rather than with the subgroups. The discussion of the separate variables here is to set the scene for the more complex analysis later on.

Proximity seeking

As for all variables, there is a striking and understandable contrast between the reactions towards the mother and those towards the stranger. Firstly, there is very little variance in the attitude towards the stranger. All children react the same way, the A1 and C children somewhat less than A2 and B3 children. Secondly, there is only a slight, be it systematic, increase over the episodes. Notwithstanding the increasing stress, children seem to seek comfort from the stranger. Of course, the presence of the mother leads to a stronger reaction of the children as a group, but it is also clear that not all children are affected in the same way: A1 and B1 children remain relatively indifferent, while the B4 and C children (closely followed by the B3 children) tend to seek the proximity of the mother from the start, and intensify this behavior all through the Strange Situation.

Contact maintaining

The patterns described above are virtually identical for contact maintaining, both with respect to the stranger and the mother, and with respect to the behavior of the subgroups, be it at a somewhat lower level of intensity, especially in the M1 and M2 episodes.

Distance interaction

An entirely different pattern can be observed for distance interaction. Whereas in the opening episode the children interact frequently with their mother from a distance, the entrance of the stranger seems to cool their enthusiasm in this respect considerably. Furthermore, if it is assumed that many interactions from a distance indicate that a child is relatively at ease in a given situation, it seems more difficult in the second reunion episode (M7) to put the child at ease, as is evident by the drop in distance interaction in M7. It can also be seen that the difference between subgroups only really

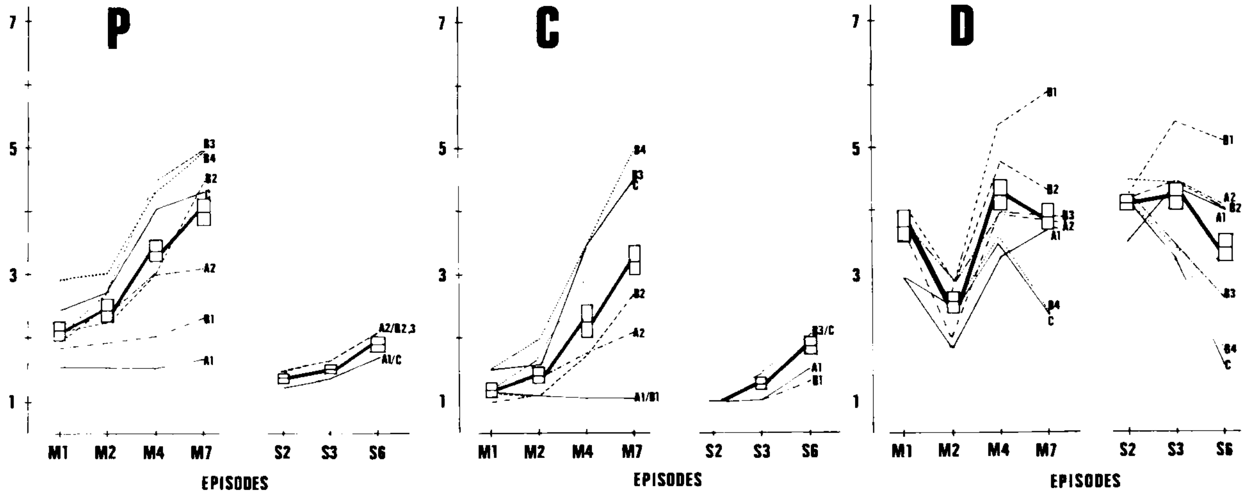

Figure 1. Trends in the means of interactive scales

Part I: Proximity seeking (P), Contact Maintaining (C), Distance Interaction (D)

(The boxes indicate the 95% confidence intervals of the means over all subgroups per episode.)

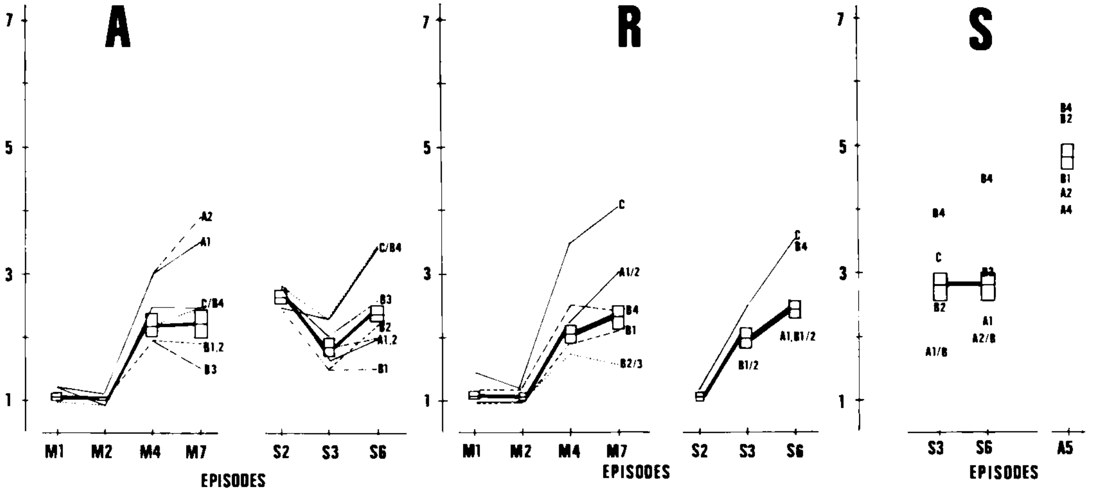

Figure 1. Trends in the means of interactive scales

Part II: Avoidance (A), Resistance (R), Search (S)

(The boxes indicate the 95% confidence intervals of the means over all subgroups per episode.)

emerges in Episode M4, and shows roughly the same pattern in M7. Note furthermore that by and large the order of the subgroups is reversed compared to Pm and Cm.

The presence of the stranger leads to a rather high level of distance interaction with the stranger in all stranger episodes, about as high as that towards the mother. Only in S6, after the child has been alone (A5), does the interaction from a distance drop somewhat. Notice that the subgroups have roughly the same position with respect to the overall averages for the stranger and the mother episodes, indicating that the amount of distance interaction seems more situation or child specific than adult specific.

Resistance

Resistance is virtually nonexistent in the first two episodes (the higher mean of the C group in M1 is due to only 8 of the 28 C's). In M4 and M7 there is a marked increase in resistance, especially in the C, A1 and A2 groups. Note that from M4 to M7, both increases and decreases occur in different subgroups. The patterns more consistently increase with respect to the stranger, except for the second episode. Note furthermore that, although the B4 and C children show higher than average resistance towards both mother and stranger, this is not true for the A1 children, who resist their mother more and the stranger less than average.

Avoidance

The intensity of avoidance towards the mother follows roughly the same pattern as resistance; it levels off a bit more, but the intensity of avoidance of the C and A subgroups is now interchanged. The trend in avoidance towards the stranger is more complex. After a high level of avoidance in the second episode, the stranger seems to be able to prevent some of this behavior when she is alone with the child for the first time, but she fails to do so to the full extent after the child has been alone. Note that the same subgroups are consistently above and below average for avoidance and resistance towards the stranger, with again the switch of the A1 children from above average with the mother to below average with the stranger.

Search

Finally, searching behavior, only scored when the mother is not present, is a fairly intensive activity of the children in the stranger episodes, and even more so when they are alone (A5). Search shows, in agreement with P and C (and D) and in contrast with A and R, a juxtaposition of the A and C children.

Summary

The scores on all variables are clearly affected by the progression of the episodes. Both averages and the variances are affected. Most averages showed a trend towards higher scores and increasing variance, but some, especially distance interaction and avoidance towards the stranger, are more complex. Furthermore, the trend is different for different subgroups. Looking at the mother episodes for the moment, it is clear that proximity seeking and contact maintaining can be seen as two indicators for one kind of "thetic" or "proximal" behavior, while avoidance and resistance for another kind of "antithetic" behavior. The patterns seem also to suggest that combining A and C subgroups does not drastically affect the antithetic patterns of scores, but it certainly does so for the thetic ones. Averaging over episode M4 and M7 seems to dampen the discriminating power of some variables, e.g., resistance and distance interaction, but not of all of them. The only real complex pattern is that of distance interaction.

Turning our attention to the stranger episodes, it seems that "thetic" behavior is largely unrelated to the subclassification, while the antithetic behavior, search and distance interaction, contains more information. Again, the trend for distance interaction and for avoidance is rather complex. On the whole, it is rather unlikely from the information in Figure 1 that the interrelationships between variables for behavior towards the stranger parallel those between the mother variables, but it is difficult to make certain statements.

An interesting aspect of Figure 1 is that one can also get an impression of the correlations between the variables, due to the patterns of the relatively homogeneous subgroup means. Roughly speaking, Pm and Cm are highly positively correlated, while Dm is somewhat less negatively correlated. The relationship between Rm and Am is far more difficult to assess. It is to a more serious study of the variable structure that we will turn next.

MOTHER EPISODES

In this section we will turn to the study of the behavior of the children with respect to their mothers and how this structure changes over time. In particular, we will investigate the deviations from the mean curves as shown in Figure 1. Thus, if we indicate a score of a child i on variable j in episode k as x_{ijk}, we will then look at $\tilde{x}_{ijk} = x_{ijk} - \bar{x}_{.jk}$ with $\bar{x}_{.jk}$ the average over all children for a variable j scored in episode k. In the regular (two-mode) principal component analysis it is usual to scale the variables as well, i.e., to equalize the variance, but as the variability is something we want to explain within the model, we will refrain from scaling here.

From Figure 1, it can already be seen that the variability increases over episodes, that is, the children react in different ways to the Strange Situation. In fact, in terms of the overall variability (i.e., sum of squares of the deviation from the respective means) the M1 episode accounts in the mother episodes for 14%, M2 for 15%, M4 for 33%, and M7 for 37%. These figures reflect the low profile in the earlier episodes compared to the intensity of the two reunion episodes which together account for 70% of the variability. The increase in variability in M7, however, is only slightly above that in M4. Note that even though on three variables (Pm, Cm and Rm) the mean levels increase, and those of the other two (Am and Dm) hardly change, this does not automatically imply an increase in the variability with respect to those means.

In the following sections we shall discuss the solution of a three-mode principal component analysis on the four mother episodes (M1, M2, M4, and M7). In particular, we shall investigate the structure in the variables and how it changes over time. To this end we will report a solution for the Tucker2 model with 4 components for the children and 3 components for the variables without a condensation in terms of components for the episodes (see Appendix A; equation A3). This will allow us to investigate how the relationships between the variable and children components change over time. The 4*3 solution for the 410*5*4 data matrix of deviations from the variable means accounts for 60% of the overall variability. The components of the variables partition the fitted variability into 35% for the first, 18% for the second and 7% for the third component, and the children components partition the same variability in 29%, 16%, 9% and 7%, respectively. As in regular principal component analysis, we will discuss the children components only through those of the variables, and without further external information on the children there is no other way to explain the distribution of the children over the axes. The overall impression of the children's scatterplot is that of a four-dimensional ellipsoid with relatively few stragglers on the outside, their number slightly increasing for the higher-order components.

Table 1
Variable components for mother episodes

	Unrotated			Varimax rotated		
Variables	1	2	3	P	D	RvA
Proximity Seeking	.58	.51	-.21	.78	.15	-.11
Contact Maintaining	.63	.19	.13	.62	-.18	.18
Resistance	.02	.01	.87	-.08	-.09	.86
Avoidance	-.04	-.21	-.43	-.09	-.12	-.45
Distance Interaction	-.52	.81	-.01	-.02	.96	.08
% Variability	34.9	18.2	6.7	30.1	22.6	7.0

Note. P = Proximal Behavior; D = Distal Behavior; RvA = Resistance vs. Avoidance

Table 1 shows the structure of the variables. After the varimax rotation of the orthonormal components, the rotated components account for 30%, 23%, and 7% respectively. Clearly proximal behavior (Pm and Cm) determines the first axis, distal behavior (Dm) the second, and the antithetical behavior (Rm versus Am) the third with resistance loading twice as heavily as avoidance.

With these straightforward interpretations of the components, we can turn to the changes of these variable components over time, and to the way the children "use" these components in different ways. To this end we will describe the profiles of "ideal-type" children on the variable components. An "ideal-type" child is defined as a child which has a nonzero loading on only one child component, and which has zero loadings on all other components. A positive ideal-type child has a positive loading, and a negative ideal-type child has a negative loading on a particular component.

Children profiles

Figure 2 gives the profiles of all four positive ideal-type children (for negative ideal-type children the profiles are a mirror image with respect to zero). The profile of the first ideal-type child representing 25% of the total variability, shows a strong increase with respect to the average in proximity and contact maintaining and a strong relative decline in distance interaction, while the resistance and avoidance contrast is just about average. For the first negative ideal-type

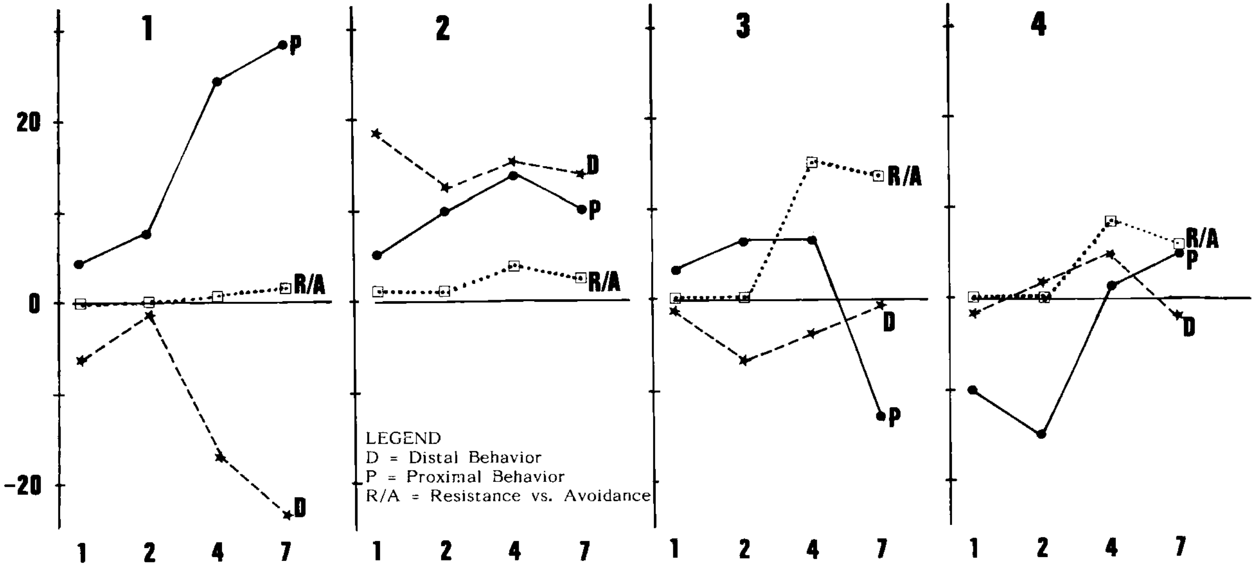

Figure 2. Profiles of ideal-type children, for mother episodes.

Varimax-rotated variable components.

child the reverse is true, that is, a strong decline for proximity and contact maintaining and a strong increase in distance interaction. If one wants to relate these profiles to the Ainsworth classification, the first positive ideal-type child shows most resemblance to the B3 and - to a lesser extent - to the B4 subcategory. B3 and B4 children show relatively much proximity seeking and contact maintaining, and little distance interaction. In the B4 subcategory some resistant behavior is shown, but of course less than in the C group. The negative ideal-type does not resemble a subcategory in particular.

The profile of the second ideal-type child (16%) deviates less strongly from the average for proximity and contact maintaining, but now distance interaction deviates in the same direction in contrast with the first ideal type. The resistance versus avoidance axis still does not show important deviations, therefore we suggest that the B1 and B2 subcategories resemble this profile most. B1 and B2 show proximity seeking and especially contact maintaining behavior to a lesser degree than the other B subgroups. Their style of interaction is also more distant. The small deviation from the average for resistance and avoidance could be caused by the appearance of some avoidance in the reunion episodes, especially in episode 4 (see also Lamb et al., 1985, p.37). No subgroup directly corresponds to the negative ideal type.

The third and fourth ideal-type child have similarly shaped profiles for resistance versus avoidance, indicating that resistance is above and avoidance below the average intensity for these scales. These profiles, therefore, resemble anxiously attached subgroups. The third ideal-type profile displays a very low intensity for proximity and contact maintaining in the second reunion episode, while the intensity is above average in the earlier episodes. The A1 and especially the A2 subgroups bear some resemblance to this third profile, but one would have expected somewhat less proximity seeking and contact maintaining in the first reunion episode. Inspection of the children components suggest that no specific subgroup is associated with this ideal-type child, and that the A subgroups are more like combinations of ideal-type child two and three, than like any ideal-type child itself. The fourth ideal-type child is characterized by proximity and contact maintaining above average intensity in the last two episodes. Combined with the above average resistance and below average avoidance we suggest that C children's pattern of attachment behavior - and to a lesser extent that of B4 children - resembles this profile most. Because one of the C subcategories, C2, is rather passive and shows less active proximity seeking and contact maintaining, the P, C deviation from average is not exceptionally strong.

A fruitful line of attack for further understanding the differences between the children would be to analyze more external variables, but unfortunately they are not in the data base. It should be remembered that virtually all children are linear combinations of the ideal-type children, and that practically no "pure" children as described in the profiles are actually present. This explains partly the difficulty of relating the attachment subcategories directly to any of the axes.

It is worth noting that in contrast with the static description in the classification instructions, the ideal-type children sketched above also embody a time component. The profiles are, therefore, more informative than a mere subdivision into subgroups. For instance, the first (B3/4-like) ideal-type child shows not only a high above average Pm, Cm, and a considerably below average Dm, but also a tendency to move away from the average child on these variables. In contrast, the position of the second ideal-type with respect to the average does not change much except between the first and second episode. The third ideal-type shows considerable change between the second and fourth episodes in Rm and Am, and between the fourth and seventh episodes in the proximal behaviors. Finally, for the fourth ideal-type again variability in proximal behavior is evident. Lacking adequate significance tests and further validating variables it is difficult to make far reaching statements about these changes, but the profiles may serve as a basis for further investigations into the dynamics of the behavior of children in the Strange Situation.

Variable profiles

Not only the changes over time in the relationships between the children components and the variable components can be studied, also the profiles of the variables themselves can be investigated for each child component separately. In the present case, however, the variables align very closely with the components so that such profiles do not supply much extra information over and above that of Figure 1.

STRANGER EPISODES

The three stranger episodes can be examined in the same way as the four mother episodes. Here, too, the scores are deviations from the means of the variable-episode combinations. The three-mode analysis with again four components for the children and three for the variables accounts for 67% of the variability of the three stranger episodes. The components of the variables partition the variability into 46%, 12%, and 9% of the total variability, while the children components partition it into 36%, 13%, 10%, and 8% respectively. The four-dimensional children space seems slightly more subject to or influenced by outlying children than that for the mother episodes.

Table 2 shows the structure of the variables. After the varimax transformation of the orthonormal components the rotated components account for 36%, 12%, and 20% of the variability, respectively. The first rotated component is dominated by distance interaction, the second by proximity and contact, and the third by resistance and avoidance; all with positive loadings. Note that on the first and second components avoidance and resistance have contrasting (rather small) loadings, as do proximity and contact on the first and third rotated component. There clearly exists some similarity with the variable space of the mother episodes. But as is well known from the theory of attachment, there are no a priori grounds for assuming they are also functionally equivalent in the sense that, for instance, avoidance to the mother is indicative for the same emotion as avoidance to the stranger. The most important difference can be found in the third component with resistance and avoidance having loadings with the same sign, whereas the variable space of the mother episodes contained a component contrasting resistance and avoidance. Towards the mother children seem to show either resistance or avoidance, whereas towards the stranger children do not appear to differentiate between these anxious behaviors.

Table 2
Variable components for stranger episodes

	Unrotated			Varimax rotated		
Variable	1	2	3	P	D	A
Proximity seeking	.09	.55	.39	.06	.68	.03
Contact Maint.	-.01	.64	.26	-.10	.68	-.06
Resistance	-.37	-.27	.80	.11	.15	.90
Avoidance	-.43	-.32	.10	-.22	-.26	.43
Distance Interac.	.82	-.34	.38	.96	-.05	-.02
% Variability accounted for	46.4	12.5	8.5	35.8	11.8	19.8

Note. P = Proximal Behavior; D = Distal Behavior; A = Antithetic Behavior. All components have unit lengths.

Children profiles

Looking at the children profiles it should be realized that the ideal-type children defined in this analysis may refer to entirely different children from those in the mother episodes. We will turn to that problem in the next section.

In Figure 3 the profiles are given for the four ideal types. Each of these types defines a rather different attitude towards the stranger. The first ideal-type child shows an ever increasing amount of distance interaction towards the stranger, whereas proximity and contact maintaining remain on an average level of intensity. This child shows almost no anxious behavior towards the stranger, as is indicated by the "antithetic behavior" component being far below average level of intensity, especially in the more stressful later episodes. The first ideal-type child shows considerable sociability towards the stranger, whereas the other ideal-type children show much stranger anxiety. The main difference between the second ideal-type child and the other anxious children is the complete lack of proximity and contact maintaining, especially in the last stranger episode. There is also much less distance interaction in this last episode, indicating that this second ideal-type child does not consider the stranger a viable person for interaction. It finds the stranger rather a source of threat and anxiety. The third and fourth ideal-type children show much resistance and avoidance towards the stranger, but at the same time they mix their anxious behaviors with more positive bids for interaction. They seem to be ambivalent about the stranger. The fourth ideal-type child seems to be anxious of the stranger in all episodes, whereas the third ideal-type child is very friendly towards the stranger in the first and second stranger episode, and only begins to show stranger anxiety in the last episode. In sum, the first ideal-type child is characterized by increasing stranger sociability, the second ideal-type child can be described as showing unambiguously stranger anxiety, whereas the third and fourth ideal-type children show ambivalent stranger anxiety, with varying patterns of changes in the variable components.

SIMILARITIES BETWEEN IDEAL TYPES

In the last two sections we have examined the children profiles for both mother and stranger episodes separately. As the analyses were carried out independently of each other, there is no reason to suppose a priori that the two sets of profiles

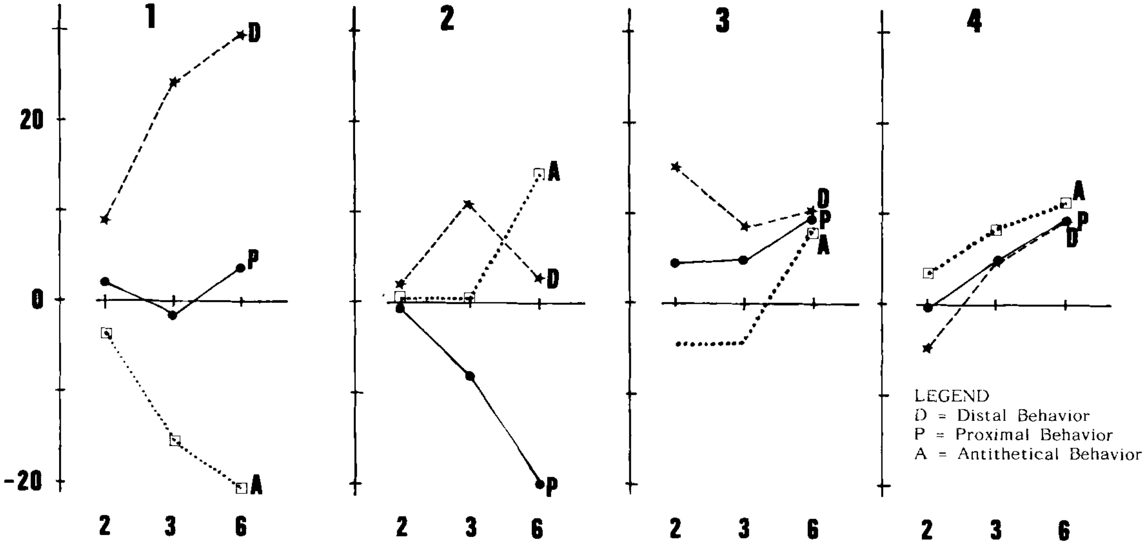

Figure 3. Profiles of ideal-type children for stranger episodes

describe identical ideal-type children. In order to investigate the extent to which the two sets do or do not describe the same ideal types both collectively and separately, a canonical correlation analysis was performed using BMDP6M (Dixon, 1981), with the relevant information given in Table 3.

The sum of squared canonical correlations (or the sum of the squared multiple correlations) is .70. Thus, the two sets have 70% of variance in common. In other words, the two spaces defined by the sets overlap considerably, but each also has variance not contained in the other set. For instance, the fourth canonical variables in the sets do not correlate at all. Each canonical axis correlates highest with one of the ideal types in each set, and the order with respect to both sets is the same. This implies that, by and large, the axes for ideal-type children have the same orientation. Except for the first canonical axis (and thus roughly the first mother and stranger ideal-type child) the canonical axes of the two sets have rather low (canonical) correlations. Therefore, even though one might improve on the similarity between the ideal-type children by using their canonical variables instead of the components defined directly by the three-mode analysis, the gain is hardly enough to make the effort worthwhile.

Table 3.
Canonical correlation analysis of children profiles from mother and stranger episodes

Correlations (or congruences) between sets

Mother episode profiles	Stranger episode profiles				$/R_m/$	Canonical correlation
	IS1	IS2	IS3	IS4		
IM1	-.60	-.30	.21	-.06	.70	.70
IM2	.03	.04	.14	-.03	.15	.01
IM3	-.13	.02	-.19	.25	.34	.37
IM4	-.02	.13	.23	.09	.07	.27
$/R_s/$	.61	.32	.39	.27		

Note. IMi = i-th ideal-type child of Mother episodes; ISi = i-th ideal-type Strange episodes. /R/ = positive square root of multiple correlation of each variable with all variables of the other set. Canonical correlations are next to the ideal-type child of the Mother episodes with which they correlate most.

It should be noted that the first canonical variables correlate -.70, while the first mother and stranger ideal types already correlate -.60. Therefore, also in this respect, the gain in using the canonical variables instead of the first ideal-type children is not large. Furthermore, it is relevant to observe that the second ideal types of the separate analyses (accounting for 16% of the variability in the mother episodes and 13% of the variability in the stranger episodes) are both associated most closely with the last canonical variables, which correlate .01, while also their mutual correlation is low, -.04. Therefore, each type of episode contains information which is not contained in the other type.

Conclusion

In conclusion it seems that the mother and stranger episodes carry both common and separate information on the behavior of the children in the Strange Situation. One way to describe this information is via component profiles of the variables over the episodes for each ideal-type child. In the present case we needed eight such profiles for describing the behavior in the mother and stranger episodes separately, all but one of which have rather low correlations (see Table 3). Given more extraneous variables it should be possible to explain the behavior of the children both with respect to the mother and stranger in more detail. Apart from this, it seems desirable to have one comprehensive analysis of at least a number of the mother and stranger episodes to acquire a more parsimonious description of the individual differences in the Strange Situation. It is to just such an investigation that we will now turn our attention.

JOINT ANALYSIS OF MOTHER AND STRANGER EPISODES

As mentioned in the Introduction, the real difficulty is to analyze the reactions of the children towards the mother and the stranger simultaneously, while still maintaining some of the temporal characteristics of the design. One solution to this problem was explored in the previous sections. Analogous to Van IJzendoorn et al. (1985) we will use in this section "phases" to tackle this simultaneous analysis. We will thus look at all mother and stranger variables combined by considering episode S3 and M4 as one phase of the Strange Situation and S6 and M7 as another. We could have included M2 and S2 as well, but this would exclude search as a variable, and it would introduce the problem of including data from one episode in which an extra dependence between the mother and stranger variables might be present due to the impossibility of simultaneous behavior towards both adults (see also the Introduction).

As in the separate analyses the variables were centered per variable-episode combination, and the variability between interactive scales was not equalized. The S6+M7 phase has a somewhat larger variability than the other phase: 55% versus 45%. The fit of the 5(children)*4(variables)*2(episodes) solution was 62% with 30.6%, 9.6%, 9.0%, 7.5% and 5.4% for the five children components, respectively; 36.5%, 9.8%, 9.3% and 6.5% for the variable components; and 54.5% and 7.5% for the two phase components. The model used here is the Tucker3 model as described in Appendix A (equation A1).

Variable components. First, we will look at the relationships between all variables, as this is in a sense the central focus of the present study. As mentioned above we will look at four variable components (see Table 4). The upper part of Table 4 refers to the variables with respect to the Stranger, and the lower part to those with respect to their mother. It is very striking that with these four components we are able to "recover" both the patterns of the stranger and the mother episodes. The varimax components 1, 2, and 4 reflect the information from Table 1, and components 1, 2, and 3 that of Table 2. The observation from the canonical analysis of the previous section that the mother and stranger episodes contain both common and separate information is thus confirmed: components 1, 2, 4, are combinations from both types of variables, component 3 is exclusively determined by the stranger variables. Component 4 is special in the sense that it parallels a mother-episode component, but also contains information from the stranger variables which was not present in the solution of the stranger episodes.

Substantively, the following patterns in the varimax solution can be observed. The first component has high positive loadings for distance interaction both towards the stranger and the mother, and a negative loading for avoidance towards the mother. This suggests that distance interaction towards the mother and towards the stranger are more quantitatively than qualitatively different. Generally, distance interaction and avoidance-M are opposite reactions. We will refer to this component as Distal Behavior. The second component shows the proximal behavior towards both mother and stranger with again a far higher intensity in the mother episodes. As could be seen from the means (Figure 1), proximity and contact are low profile behaviors in the stranger episodes with little variability. Note that, again, avoidance-M has a moderate (negative)

Table 4.
Variable components mother and stranger episodes

Variables		Unrotated				Varimax rotated			
		1	2	3	4	D	P	A	R
Proximity	- S	-.02	.25	-.17	-.03	.03	.24	-.12	-.12
Contact	- S	-.08	.20	-.24	-.01	-.07	.27	-.15	-.09
Resistance	- S	-.23	-.26	.33	.35	-.04	-.12	.26	.52
Avoidance	- S	-.25	-.18	.30	-.14	-.11	-.10	.42	.05
Distance	- S	.51	.27	-.00	-.10	.43	-.08	-.26	-.29
Search	- S	-.33	.12	.59	-.35	.14	.07	.74	-.12
Proximity	- M	-.37	.56	-.01	-.02	.10	.64	.16	-.06
Contact	- M	-.45	.31	-.20	.18	-.16	.57	.02	.15
Resistance	- M	-.03	-.21	.05	.64	-.00	-.08	-.17	.65
Avoidance	- M	-.00	-.33	-.04	-.50	-.30	-.31	.17	-.38
Distance	- M	.41	.39	.58	.18	.81	-.05	.12	.10
% variability		36.5	9.8	9.3	6.5	18.4	17.8	17.0	8.8

Note. D=Distal Behavior; P=Proximal Behavior; A=stranger Anxiety; R=Resistant Behavior

loading on this component. The component will be referred to as Proximal Behavior. The third component, characterized by high search, avoidance-S, resistance-S, and a moderate lack of distance interaction-S, is exclusively determined by the stranger variables (and thus episodes), and can be interpreted as "Stranger Anxiety", comparable to Connell's "Stranger Unsociability" factor (Connell, 1985). The fourth variable component, "Resistant Behavior (versus avoidance-M)", shows high positive resistance both towards the mother and the stranger versus moderate avoidance with respect to the mother. As we concluded before, the contrast of resistance and avoidance exists only in the case of the mother episodes. The fourth component, thus, indicates an adult specific mixture of "antithetic" behavior, in accordance with the attachment theory.

As in the separate analyses, we observe overall a reasonably simple structure for the variables which will facilitate the subsequent discussion. The only exception is avoidance towards the mother, which has a negative loading on Proximal Behavior, Distal Behavior, and Stranger Anxiety. This implies that avoidance-M tends to have below average values for children showing high intensities for Proximal Behavior and/or Distal Behavior, and/or Anxiety with respect to the stranger.
Core matrix. As explained in Appendix A, the core matrix of a three-mode principal component model indicates how the variable components, child component and phase components are related (or weighted). The values indicate how much each component combination contributes to the estimated (or reconstructed) scores based on the fitted model, and these values can be transformed to percentages variability accounted for (Table 4). Our discussion of the core matrix will deal with two aspects. First, what the two phases S3+M4 and S6+M7 have in common (based on the first phase component and the first core plane), and secondly in which aspects they differ

Table 5
Core matrix of combined analysis of mother and stranger episodes

Phase component 1: Common aspects of phases

	Raw weights				Percentage variability				
Child component	Variable components D 1	P 2	A 3	R 4	Variable components D 1	P 2	A 3	R 4	Sum
1	31	-29	-28	-13	11	9	9	2	31
2	-10	14	-18	-14	1	2	4	2	9
3	-20	-17	- 7	5	5	3	1	0	9
4	- 3	- 6	12	-16	0	1	2	3	5
5	0	- 2	6	- 9	0	0	0	1	1
Phase component 2: Differences between phases									
1	2	1	1	- 0	0	0	0	0	0
2	2	7	- 4	1	0	1	0	0	1
3	4	- 0	1	- 1	0	0	0	0	0
4	- 3	11	8	4	0	1	1	0	2
5	13	- 8	-11	- 5	2	1	1	0	4

Note. D = Distal Behavior; P = Proximal Behavior; A = Stranger Anxiety; R = Resistant Behavior.

(based on the second phase component and the second core plane). As can be judged from the percentage variability accounted for per component (54.5% versus 7.5%), the two phases have far more common aspects than differences. From the entries in the core matrix it follows that the first four child components reflect almost only the common aspects of the two phases (common: 31%, 9%, 9%, 5% variability accounted for; difference: 0%, 1%, 0%, 2%), while the fifth child component reflects primarily the differences between phases (common: 1%; difference: 4%). Furthermore, it is evident that the core matrix has a rather complex pattern which defies simple description. The original, nonrotated, core matrix has a simpler pattern, but the bipolarity of the unrotated variable axes makes the description somewhat uncomfortable.

Just as for the separate analyses in the previous section, each of the child components (or ideal-type children) may be interpreted in terms of components of the variables. The first (positive) ideal-type child shows in the two phases considerable Distal Behavior (variable component 1: core element of 31), below average Proximal Behavior (2:-29), low Stranger Anxiety (3:-28), and relatively low Resistant Behavior (4: -13). As avoidance-M is weighted negatively by the first, and positively by the second and fourth variable component, the net avoidance-M is slightly or moderately above average. These ideal-type children come closest to B1 and possibly A2 children. As before the negative ideal-type shows the reverse pattern: very much below average Distal Behavior (1:-31); above average Proximal Behavior (2:29), considerable Stranger Anxiety (3:28), relatively high Resistant Behavior (4:13) and little avoidance-M. This negative ideal-type resembles B4 or C children most.

For the second (positive) ideal-type child, lower Distal Behavior (1:-10) is coupled with higher Proximal Behavior (2:14) at an overall lower intensity compared to the first ideal type. The lack of anxiety towards the stranger (3:-18), a lower than average Resistant Behavior (4:-14), and a somewhat above average avoidance-M complete the picture (avoidance-M is positive on 1 and 4, and negative on 2). This ideal-type child can be compared most adequately with the B2 subcategory, perhaps in combination with the next ideal-type child. The third (positive) ideal-type child has a lower than average Distal Behavior (1:-20), and less than average Proximal Behavior (2:-17), but Stranger Anxiety, Resistant Behavior, and avoidance-M are all about average. The fourth ideal-type child is more or less average on Distal Behavior; it has moderate Stranger Anxiety (3:12) and its score is lower on Resistant Behavior (4:-16) and rather high on avoidance-M. In addition, as is evident from the second core plane, it tends to show more Proximal Behavior in the second than the first phase. In fact, it reacts more intensely on all interactive scales in the S6 and M7 episodes than in the preceding ones, be it not very much. Here the resemblance with some subgroup of avoidant children appears to be significant. Finally, the fifth (negative) ideal-type child is characterized more by change than anything else, in particular it shows less Distal Behavior (-13) in the later than the earlier phase, especially more Anxiety (+11), about the same avoidance-M, more Resistant and Proximal Behavior, and on the whole it shows above average avoidance-M.

Characteristics of individual children

From the above descriptions it is rather difficult to get a good picture of the individual children; in particular, because they are generally combinations of more than one ideal-type child. One may therefore argue that the core matrix is too compact a description for a detailed understanding of the individual differences between children. Furthermore, the orientation of the axes in the child space does not necessarily coincide with familiar descriptions in terms of the classification into subgroups. The necessary information will be supplied by constructing "joint plots" for each of the phase components, that is by displaying how the children and variables are related to each other for the aspects they have in common, and for the ways in which they differ. As explained in Kroonenberg (1983, p.164ff), given 5 components for the children and 4 components for the variables, at most a four-dimensional representation is possible in the joint plots. Instead of showing the 6 possible combinations of components we will show only the first, third, and fourth components against the second component for the common part, and only the first two components for the differences (for an explanation see below).

Common aspects of phases. Figures 4A to C are based on the joint plots for the common characteristics of the phases. The original plots contain all variables and all 410 children. The present stylized versions only give the centroids of each of the classification subgroups plus approximate confidence intervals based on 2.1 times the standard error for each of the axes. The value 2.1 is chosen to reflect the situation in which all 21 pairwise contrasts between means may be visually tested by an extension of a procedure described by Gabriel (1978). The value of 2.1 is also in agreement with a Bonferroni adjustment for the simultaneous testing of all pairwise contrasts between means. The orientation of the axes is such that they correspond to the varimax solution given earlier.

The centroids in the plots are connected by a line running from A1 through A2, B1, B2, B3, B4, to C. The second component (Proximal Behavior) was chosen as the common axis in the plots because it was considered theoretically more important and interesting than the first or "Distal Behavior" one. It should be noted that the subgroup information was not explicitly used in the analysis.

Figure 4A shows the plane of the Proximal and Distal Behavior axes. With respect to the variables, it is dominated by three groups of variables at angles of roughly 120°, i.e., the (Pm, Cm, Ps, Cs) group, the (Dm, Ds) group, and the (Rm, Am, Rs, As) group. The subgroup centroids show a fairly regular progression through the plane. A characterization of the subgroups in terms of their centroids on the axes is given in Table 6. In Figure 4A we see that with the two dimensions given, and using the contours of the centroids for rough significance testing as explained above, A1, A2, B1, B2 are all clearly and recognizably different, and all are different from the B3, B4, and C groups. B3 and B4 are on the borderline of significance, while B4 and C are not separated. To distinguish between B4 and C we need either the third or the fourth axis, as the B4 children show more Stranger Anxiety than the C children, and the latter show more Resistant Behavior than the former.

The Figures 4A, B and C and Table 6 together provide the descriptive information to type each of the subgroups. Up to a point, these descriptions will coincide with the classification instructions. On the other hand, they give a more independent account than, for instance, discriminant analysis can give. As our prime focus is the variables rather than the subjects we will not discuss each subgroup in detail, but merely cite a few highlights.

Compared to the "normative" B3 subgroup all other subgroups score above or below average on Resistant Behavior (versus avoidance-M): A1 to B2 subgroups show more avoidant behavior, B4 and C more resistant behavior. The B3 subgroup also has an almost zero mean on the Distal Behavior axis. B1 and B2 children have higher scores on Distal Behavior, whereas the avoidant-attached children show less Distal Interaction to mother and stranger, and B4 and C even less than A1 and A2. Although the "normative" B3 subgroup has almost zero means on the Distal and Resistant Behavior axes, the same subgroup has the highest mean on the Proximal Behavior. A1 to B1 children show very low intensity Proximal Behavior, whereas B4 and C children stay close to the mean of the normative subgroup. It is satisfying that this pattern, based on components for mother and stranger episodes, parallels the instructions of the classification system, which is primarily based on the mother

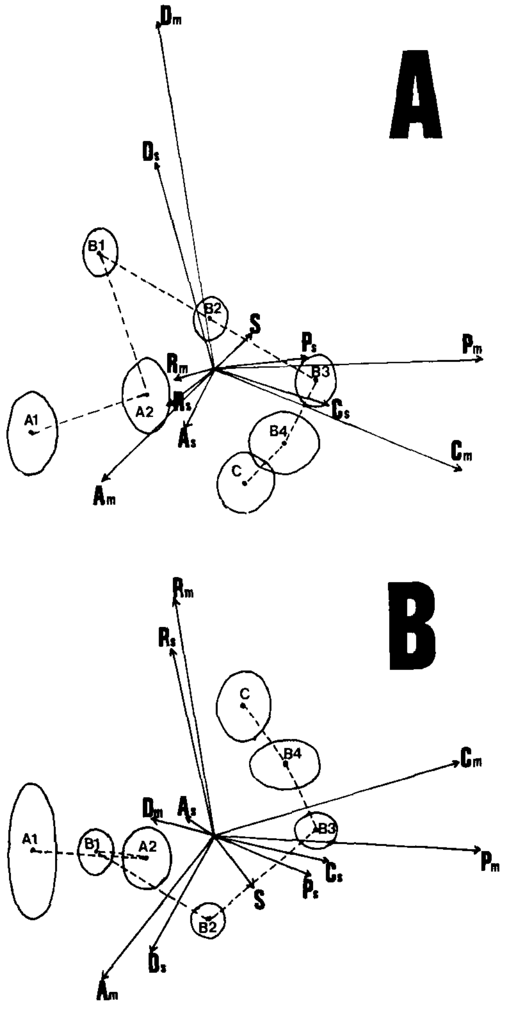

Figure 4. Joint plot of subgroup centroids with approximate confidence ellipsoides and interactive scales (associated with the first phase component)

A: Thetic Behavior versus Distal Behavior
B: Thetic Behavior versus Resistant Behavior
(For description of variables - see text.)

episodes. The inclusion of stranger episodes in the analysis does not distort, but rather adds information to the classification procedures, e.g., generating a component for Stranger Anxiety. In this respect we see that the normative B3 subgroup does not deviate from the anxiously-resistant children in showing moderate anxiety, but B4 children strongly differ from the other children in showing considerable Stranger Anxiety. A1 to B2 subgroups seem to be far less disturbed by the stranger's presence than the B3 to C subgroups. The B4 subgroup - which we characterized as dependently attached to their caregiver (Van IJzendoorn et al., 1985; Sagi et al., 1985) - resembles B3 most on the Proximal Behavior axis, and is closest to the C group on Distal Behavior. B4 holds an intermediate position on the Resistant Behavior axis, and is unique in its extreme score on Stranger Anxiety.

From the perspective of axes, it is not clear how a one-dimensional continuous scale could be derived from Strange Situation data without distorting or ignoring much information. The ordering of subgroups A1 to C appears to be different for all components:

Proximal Behavior : A1<B1<A2<B2<C <B4<B3
Distal Behavior : C <B4<A1<A2<B3<B2<B1
Resistant Behavior (versus avoidance-M) : B2<A2<B1<A1<B3<B4<C
Stranger Anxiety : B1<A1<A2<B2<C <B3<B4

The only component on which a scale "security of attachment" could be based, seems to be Distal Behavior. On this component, C/B4/A1/A2 score on one side of the continuum, whereas the secure groups score on the opposite side. The dichotomization into anxiously and securely attached children cannot be derived from our data; on the contrary, it seems to be more in accordance with the data to cluster the A1 to B2, and the B3 to C subgroups. Theoretically, however, such a dichotomization does not imply concrete hypotheses about differential antecedents and consequences of the two clusters. Because subgroups do not show the same ordering on all components, and because adjacent subgroups within the same main classification group do not always score in clusters, the question could be asked whether the information contained in the Strange Situation could not be better represented by continuous variables, resembling our components, rather than by discrete categories, which cannot easily be traced back to (a combination of) the constituting variables.

As noted before, the role of avoidance-M is rather difficult to assess from Table 6, as it loads on three axes (negatively on Proximal, Resistant and Distal Behavior). When all

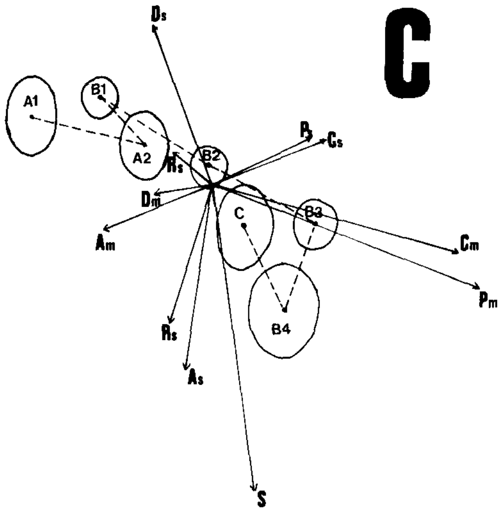

Figure 4. Joint plot of subgroup centroids with approximate confidence ellipsoides and interactive scales (associated with the first phase component)

C: Proximal Behavior versus Stranger Anxiety
(For description of variables - see text.)

Table 6
Mean coordinates of subgroups for axes of joint plot (associated with first phase component)

	Means on axis			
Sub-group	Proximal Behavior	Distal Behavior	Resistant Behavior (versus Avoidance-M)	Stranger Anxiety
A1	-1.02	-.35	-.08	-.38
A2	- .38	-.15	-.13	-.22
B1	- .63	.64	-.09	-.48
B2	.03	.28	-.27	-.11
B3	.57	-.06	.03	.23
B4	.40	-.42	.20	.70
C	.17	-.63	.72	.22

signs on these axes are negative, as is the case for the A1, and A2 subgroups, there is much avoidance-M for these groups. This can clearly be seen in Figure 4A and B. The above trends conform to the common characteristics attributed to the various subgroups (see e.g., Lamb et al., 1985), but in this analysis the role of the stranger variables and their relationships with the mother variables has become much clearer. Furthermore, it is also very clear that there exists a tremendous variability between children in one subgroup, and on the basis of the original joint plots it is very tempting to question several assignments to subgroups. It should be emphasized that subgroup membership was not used in the analysis except for post-hoc calculations of the means.

Turning now to the differences between the two phases no clear structure emerges with respect to the subgroups, as can be seen from Figure 5, which represents 7% of the total variability. There is no differentiation on the first, most important, axis, and some A and C contrast for the second one. This implies that the changes from Phase 1 to Phase 2 are not much related to subgroups. There is some evidence that many C children have relatively more avoidance-M (and less Dm, and Pm, Cm) in M7 than in M4, while just a few A children show more Dm and Pm, Cm and less Am in M7 than in M4. There is also a group of children, mainly some C, B4, and B2, which show more Stranger Anxiety in S7 and less distance interaction in S6 and M7 than in S3 and M4.

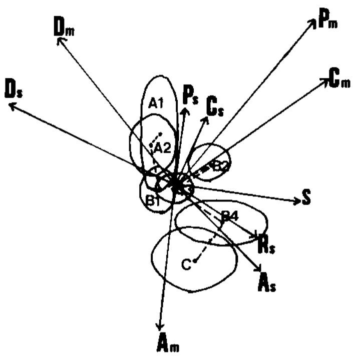

Figure 5. Joint plot of subgroups centroids with approximate confidence ellipses and interactive scales (associated with the second phase component)

DISCUSSION AND CONCLUSIONS

The results of the three-mode principal component analyses on the multinational data set could have acquired much more significance if informative measures for, among other things, frequency of crying and exploratory behavior, had been available. Unfortunately, not all researchers score exact frequency measures because of their irrelevance for globally classifying children in one of eight attachment subcategories. Furthermore, all kinds of external data about the 410 children were lacking. Even sex and age of the children could not be used in our analysis as these background variables have not (yet) been added to the multinational data set. On the other hand, the nationality of the children has been ignored on purpose. We started from the assumption that the coding instructions were rather strictly adhered to and were interpreted in the same way in all countries, notwithstanding some possible sample-specific interpretations (see Lamb et al., 1985, p. 212). The question whether the same psychological value has to be attributed to the same scores in different countries is explicitly left aside (see, however, Sagi & Lewkowicz, chapter 11, this volume).

With these restrictions in mind, it appears possible to suggest some answers to the central question posed in the Introduction: 'Are there a number of continuous variables besides "security of attachment" which can give us more information about individual differences than is contained in the rather global, discrete A-B-C typology?' The interactive scales in the two reunion episodes are known to determine the classification to a large extent, but in our analyses we have also used data from other episodes. For example, data from the stranger episodes have been included allowing us to characterize the relationships between the child's behavior in both the mother and the stranger episodes.

The discussion is organized around three main topics. Firstly, we will tackle the question of how the description of Strange Situation behavior through the nominal classification can be complemented with some continuous dimensions. In this way we hope to represent the richness of the Strange Situation data more adequately than through a "simple" trichotomization. Secondly, the usual categorization of mother-child relationships in several different subgroups will be discussed, as well as a typology of stranger-child interactions. Special attention will be paid to the status of the B4 subgroup. Thirdly, we will focus on the dynamics of the Strange Situation procedure. In our analyses time was included by means of the episodes, and this allowed us to look at, possibly systematic, changes in behavior in the course of the episodes.

Discrete versus continuous descriptions

With respect to the description of Strange Situation behavior by a set of continuous variables, this study showed that there are three important components describing the behavior in the mother episodes: Proximal Behavior, Distal Behavior and Resistance versus Avoidance. The stranger episodes, too, can be described by means of three components, namely Proximal Behavior, Distal Behavior and Antithetic Behavior, this last component indicating a combination of resistance and avoidance instead of a contrast between the two. The combined analysis of the mother and stranger episodes showed a similarly clear structure: Proximal Behavior and Distal Behavior return as components on which behavior towards the mother as well as that towards the stranger loads. A third component "Resistant Behavior (versus avoidance-M)" indicates the contrast between resistance and avoidance-M. The fourth component is specifically bound to behavior in the stranger episodes, and has been called Stranger Anxiety.

The results from the combined analysis of the stranger and mother episodes may be compared with results from Lamb et al.'s (1985, p.217) cluster analysis and Connell's (1977, p.136) nonlinear mapping (which, incidentally, is not a clustering technique as claimed by Connell). Both studies indicated the importance of the distance interaction versus proximity contrast which is paralleled by our first *unrotated* component (Table 4: Ds=.51; Dm=.41; Pm=-.37; Cm=-.45). Connell's "Distance/Avoidance versus Proximity/Contact Maintaining" axis, however, shows avoidance loading positively on the Distal Behavior component. In our case we may conclude that distance interaction-M and proximal behavior-M are in fact orthogonal, and as mentioned before avoidance-M has a rather complex relationship with the other variables. In accordance with Lamb et al. (1985), we must conclude that it is too simple to restrict the Strange Situation behavior to a Security of Attachment dimension. Nor can we equate Security of Attachment with our Distal Behavior axis, notwithstanding the contrast between anxiously and securely attached children on this axis (see Table 6), because the ordering is not as it should be for such a dimension.

The emphasis placed on proximal and antithetical behavior in the coding instructions is paralleled in our analyses by the importance of the components for proximal and antithetic behavior. On the other hand, the component Stranger Anxiety appears to supplement the information from the classification. Although Sagi & Lewkowicz (chapter 11, this volume) suppose Stranger Anxiety to be a culture-specific factor influencing the classification, we doubt whether this component is contained in the classification. The distribution of anxiously versus securely attached children certainly does not appear to be influenced by Stranger Anxiety (Table 6). We suggest it would further our knowledge of antecedents and consequences of Strange Situation behavior if future research takes Stranger Anxiety into account. In addition, from the component Resistant Behavior and the complex loading pattern of avoidance-M, it can be inferred that the construction of a continuous variable "Antithetic Behavior towards the Mother" by adding the scores of Rm and Am does not do justice to the intricate nature of the relationships between the antithetic and other behaviors.

Subgroups

Without explicitly using the classification into subgroups in the main analyses of the mother and stranger episodes, it is clear that the subgroups can easily be traced in our solutions. Even though the particular directions of the ideal-type children in the various child spaces are in some sense arbitrary, the ones described often showed characteristics of the usual subgroups from the Ainsworth classification system. With linear combinations of those ideal-types the other groups can be reasonably described, be it that we have not worked this out in detail, except for the combined analysis of the mother and stranger episodes. The reasonable recovery of the subgroups indicates that children which were "clinically" classified into a subgroup tend to end up roughly in the same sector of the child space, suggesting that the linear combinations of variables and children (and episodes) used in the three-mode analyses at least approximate the clinical assignment rules. On the other hand, the clusters of children from a specific subgroup are not particularly tight: the borders between the clusters are rather vague, and the clusters overlap a great deal. Unless combination rules exist which do a spectacularly better job at separating the subgroups, one may wonder if the discrete classification procedure should not be seen as a procedure to transform continuous dimensions into discrete ones. If one accepts this possibility, one may try to devise "statistical" assignment rules rather than "clinical" ones for assigning children into subgroups. Previous research on statistical versus clinical prediction has often shown the former to be superior (e.g., Sawyer, 1966; Einhorn, 1972). Statistical prediction has the additional advantage that the uncertainty of classification can be determined. Furthermore, it may prevent the kind of gross errors that seem to exist in the present data set. That classifications were incorrect was judged from a child's location in the child space far away from any other member of its subgroup.

Summarizing the relationships between ideal-type children and subgroups, we note that the difference between anxiously and securely attached children was clearly reproduced in the four ideal-type profiles of the mother episodes. The first two profiles indicated securely attached children, and the last two anxiously attached children. Furthermore, within the B group the difference between B1/B2 and B3 could be found in the first and second ideal-type profile. The C-category was represented in the fourth ideal-type profile. Only the A-category could not be reproduced easily from the data. We also suggested a typology of stranger-child relationships. In describing the ideal-type children for the stranger episodes, the first ideal-type child could be characterized by a high degree of stranger sociability, the second ideal-type child could be described as unambiguously anxious toward the stranger, and the last two ideal-type children had to be considered as ambivalently anxious toward the stranger, mixing resistance and avoidance with proximity seeking and contact maintaining.

Because the contours of established subgroups are already rather vague and overlap each other, the status of so-called "marginal" subgroups as B1 and B4 will almost certainly be more controversial. In an earlier study it was concluded (Van IJzendoorn et al., 1985) that B4 children as well as C children were characterized by a high degree of dependent behavior such as crying and clinging mixed with relatively positive interactions toward the mother, and extremely negative reactions toward the stranger. Dependent children, as they were called, showed almost no avoidant behavior and still less exploratory behavior and distance interaction. The difference between C and B4 children was found to exist in the degree of resistance to the mother in the second reunion episode. If we take the results of this study into account, and especially data presented in Table 6, B4 children again show little distance interaction and show (some) resistant behavior. B4 children, however, resemble B3 children more on the Proximal Behavior component, showing more proximity seeking and contact maintaining than the C group. The difference between B4 and all other subgroups may be characterized best by their unique position on the Stranger Anxiety component. B4 children show the most Stranger Anxiety of all subgroups. Because of these characteristics, the present results confirm and strengthen our previous typing of B4 children (but it should be remembered that the present data contain the earlier data of the Dutch sample). Dependency implies fixation on the familiar adult in a somewhat ambivalent way, and unwillingness to socialize with strangers, and this is precisely the picture arising from our analyses.

Dynamics of the Strange Situation

With respect to the dynamics of the Strange Situation, patterns could be described but their interpretations are still rather tentative. The means showed clearly the increasing intensity in the course of the procedure, and showed furthermore an increasing variability and differentiation between the children. It was our intention to shed some light on the structure of this increased variability by using three-mode analyses.

One way was to show profiles of children for both the mother and stranger episodes separately (Figures 2 and 3). These profiles provide clear indications that varying patterns of reactions towards the increasing stress of the Strange Situation exist. Some children show increasingly deviating scores away from the average, while other children show more irregular patterns. The changes occur on different variables for different children. It is still too early to explain in detail why certain changes occur for a certain type of children on particular variables. In particular, more external information is necessary.

The second way to investigate the dynamics was to separate the aspects the S3+M4 (Phase 1) and S6+M7 (Phase 2) episodes have in common from those they do not. In that analysis, too, we were looking at deviations from the means per variables for each episode. The basic conclusion was that the overall structure between the variables and the position of the children on those variables do not change much between Phase 1 and Phase 2, notwithstanding the overall increasing means (Figure 1). Whereas the major part of the accounted variability (55%) reflected the classification in many ways, the changes between Phases 1 and 2 (accounting for only 7%) show little relationship to the classification. The changes seem to be far more related to individuals than to groups. Primarily, there is a tendency to have higher scores in the second phase for Proximal Behavior and Stranger Anxiety coupled with lower scores on Distal Behavior for some children, while the reverse pattern is true for another group of children.

Final remarks

The relationship between behavior in the stranger and in the mother episodes is rather complex. Three-mode principal component analysis suggests that there is substantial common variance (70%), but each set of episodes also contains variance, not shared by the other set. This is, for instance, expressed in low correlations between the different canonical axes. Only the first axes, corresponding with the first ideal-type children of both the mother and stranger episodes, correlate moderately high (-.60). This implies a relation between Stranger Sociability and B1/B2 type of attachment (see Thompson & Lamb, 1983; Lamb, Hwang, Frodi & Frodi, 1982). The direction of influence is unclear: Is a child with a high degree of Stranger Sociability more likely to be classified as a B child, or are B children more sociable to the stranger. It seems that in this respect three-mode principal component analysis has less to offer than modelling with structural equations (Connell & Goldsmith, 1982), in which specific causal connections between behavioral components in different episodes are tested. The size of the aggregated multinational data set is large enough to study the dynamics of the Strange Situation reliably with such a method provided it is theoretically justifiable to analyze all children together irrespective of their classification.

In summary, three-mode principal component analysis of 410 subjects observed in the Strange Situation procedure showed that the subgroups of the classification system can be discriminated from each other using behavioral components. However, the contours of the subgroups are rather vague and show much overlapping. Therefore, it would be better not only to use the "simple" nominal classification in analyzing outcomes of the Strange Situation, but to use continuous component scores as well. We showed that these components contain information not available in the classification, as for instance a component measuring Stranger Anxiety which deserves further study and application.

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Frits A. Goossens made available the scores on the interactive rating scales of the reunion episodes, and classifications of the Dutch data set; the second author of this chapter added the other data.

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APPENDIX A: THREE-MODE PRINCIPAL COMPONENT ANALYSIS; A SHORT DESCRIPTION

In the Strange Situation we have information available on several interactive scales from a number of children in several episodes We are, among other things, interested in knowing whether the measurements can be described by a smaller number of linear combinations of the interactive scales. Such linear combinations will be referred to as components, and the values on the components will be called loadings. We will assume that a few of these components will adequately approximate the systematic part of the data. If we look only at one episode the components can be determined by standard principal component analysis.

If we include all episodes, the data can be classified by three different kinds of quantities or "modes" of the data: children, scales, and episodes. We are still interested in the variables, but now for all episodes simultaneously. Moreover, we are interested in knowing whether the children are mere replications of each other or can be seen as linear combinations of what we may call "idealized children" or "ideal-type children", i.e., children loading exclusively on one component. Similar questions may arise with respect to the development of the measurements over time, that is, whether the longitudinal changes in the structures of the variables can be described for several episodes together.

One way to approach such questions is to analyze these questions for each mode separately. For instance, the structure in the scales or variables can be investigated after averaging over the episodes or by analyzing the (children x episodes)-by-variables matrix disregarding the dependence between the observational units and the autocorrelation between the variables in different episodes. A more satisfactory way to analyze the data, which can be arranged in a three-dimensional block of children by scales by episodes, is to search for linear combinations of all three modes simultaneously. This would entail finding principal components for each of the three modes and determining how these components are related or weighted. These relationships or weights are explicit parameters in the three-mode models to be used, and they are collected in a small three-mode matrix or block, which is commonly called the "core matrix".

From a technical point of view, three-mode principal component analysis is a generalization of the singular value decomposition of two-mode data (for a technical discussion of the singular value decomposition, see e.g., Good, 1969). In essence, the decomposition is a simultaneous principal component analysis of, for example, both children and variables, in which the weights for each of the M components of the children and P components of the variables are represented by the two-mode matrix G (or X=AGB' with A of order (IxM), B of order (JxP), and G of order (MxP)). For two-mode data, the core matrix G is necessarily square (P=M) and diagonal under the assumption that the component matrices are orthonormal for both variables (B) and children (A). Each element g_{mm} of G is equal to the singular value or square root of the eigenvalue associated with the m-th component of the variables and the m-th component of the children.

In three-mode principal component analysis, there are three component matrices - A, B, and C - instead of two. And as with the data matrix, the core matrix G with singular values has three modes, and it again contains the weights (or relationships) between the components. But these relationships are far more complex than in the two-mode case, as any component of a mode can have a nonzero weight with any component of another mode.

A more formal description of the three-mode principal component model may be made as follows. If we write the elements of the data matrix X of children by variables by episodes as x_{ijk} (i=1,..,I;j=1,..,J;k=1,..K), then the model (the so-called Tucker3 model) has the following form

$$x_{ijk} = \sum_{m=1}^{M} \sum_{p=1}^{P} \sum_{q=1}^{Q} a_{im} b_{jp} c_{kq} g_{mpq} + e_{ijk} , \tag{A1}$$

which may be written in matrix notation using the Kronecker product

$$X = AG(C' \otimes B') + E . \tag{A2}$$

As discussed above $A=(a_{im})$, $B=(b_{jp})$, and $C=(c_{kq})$ are component matrices of children, variables and episodes, respectively, and they can be taken columnwise orthonormal without loss of generality. $G=(g_{mpq})$ is the core matrix with the relationships between the components (or weights for the combination of components). Finally, $E=(e_{ijk})$ is the matrix with residuals or errors of approximation.

A slightly different but instructive way to interpret the core matrix is to view it as a (miniature) data box with "idealized" quantities rather than observational ones, that is "latent" variables instead of manifest ones, ideal-type children instead of real children, and trends instead of episodes.

A value g_{mpq} in the core matrix is then the score of an idealized child m on a latent scale p for a particular trend q. In this way the core matrix can be seen to embody the basic relationships that exist in the data.

One may expand the three-mode model given in (A1) to provide more detail by not computing components for, say, the third mode at the cost of parsimony of description. In particular, equation (A1) may be written as

$$x_{ijk} = \sum_{m=1}^{M} \sum_{p=1}^{P} a_{im} b_{jp} n_{mpk} + e_{ijk}, \qquad \text{(A3)}$$

with

$$n_{mpk} = \sum_{q=1}^{Q} c_{kq} g_{mpq} \qquad \text{(A4)}$$

and thus

$$X_k = AN_kB' + E_k \qquad \text{(A5)}$$

in which X_k is the (IxJ) matrix of observations for the k-th episode. The N_k are the so-called "core matrices for episodes". The model described by (A3) is often called the Tucker2 model.

In the main body of the chapter we have analyzed the four mother episodes and the three stranger episodes each with model (A3), and the joint analysis of mother and stranger variables with model (A1). Figures 2 and 3 are based on the "core matrices for episodes". The panels of these figures show for each of the four child components the n_{mpk} as curves of the variable components p over the episodes $k=1,..,k$. The core matrix given in Table 5 is the matrix G from equation (A2).

The analyses presented here were performed using the programs TUCKALS2 (model A3) and TUCKALS3 (model A1) developed by Kroonenberg using the alternating least squares (ALS) algorithms described by Kroonenberg & De Leeuw (1980; Kroonenberg, 1983), in which the technical aspects of the algorithms are dealt with. More extensive descriptions of the technique and related issues can be found in Tucker (1966, 1972), Kroonenberg (1983; 1984), Harshman & Lundy (1984a,b), and Snyder (1986).

APPENDIX B: DATA PREPARATION

In this Appendix, we provide a summary of the data base used in this chapter. Several researchers from six different countries pooled their data from the Strange Situation. A. Sagi supplied two data sets, one with 258 Kibbutz children (Sagi et al., 1985), and one with 36 day-care children (Sagi et al., 1985), both from Israel. J. Belsky contributed the data of 58 American children (Belsky et al., 1984), E.K. Beller the data of 40 German children (Beller, 1984). F.A. Goossens and M.H. van IJzendoorn the data of 137 Dutch children (Goossens, 1986; see also Van IJzendoorn, Goossens, Kroonenberg, & Tavecchio, 1984); M.E. Lamb the data of 51 Swedish children, and K. Miyake those of 28 Japanese children (Miyake et al., 1985). The complete data set was brought together by A. Sagi in Israel, in cooperation with J.P. Connell. The date of the version used here is 20 March 1986.

The records contain several missing data; especially entire episodes in the Israeli data are frequently not available (see Sagi et al., 1985; Sagi & Lewkowicz, chapter 11, this volume). The complete data set consists primarily of mother-child dyads, but the Belsky data also contain father-child dyads, while in the Israeli Kibbutz data father, mother and metapelet occur as adults. For the analysis reported here, only mother-child data are included, which have at most one complete episode missing. For the 410 dyads remaining, all other missing data on the interactive scales were substituted by mean values. In particular, the scale mean of the appropriate attachment subgroup of the country in question was substituted. When for a country all values on a scale were missing, the mean over all countries was used for the relevant subgroup. This was done for the Belsky data, which contained no valid data for Search for any episode. The missing value for an American child (Thompson data), and the one unclassified child (Israeli Kibbutz data), were excluded from the computation, wherever necessary. The 27 C1 and 9 C2 children were taken together as one C group, to avoid a too great imbalance in the number of children per subgroup. Differences exist between distributions of children over subgroups between the various countries. With respect to the main groups A, B, C, the differences are not particularly large, compared to the "global" distribution (see Sagi & Lewkowicz, chapter 11, this volume, Table 1.).

A detailed report on the data preparation is available from the authors.

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ATTACHMENT IN SOCIAL NETWORKS
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CHAPTER 11

A CROSS-CULTURAL EVALUATION OF ATTACHMENT RESEARCH[1]

Abraham Sagi and Kathleen S. Lewkowicz

ABSTRACT

This chapter deals primarily with issues related to the validity of the Strange Situation procedure in cross-cultural research. Specifically, we show that the relative proportion of infants classified as secure and insecure is not the same, and that the ratio between the A (avoidant) and C (resistant) groups often varies as well. Also, inconsistencies seem to characterize samples within the same culture. Moreover, the composition of the various subgroups within the secure categories is not the same across cultures.

A number of alternative explanations are proposed to account for such inconsistencies. First, it is proposed that the psychological meaning of the Strange Situation may differ for infants and adults in various countries. Second, there are some indications, albeit not systematically documented, that the Strange Situation procedure has not been implemented in a similar way in the different countries. Third, issues of classification are shown to be of major relevance. The issues discussed above have implications for research concerned with the antecedents and consequences of Strange Situation behavior. Moreover, the concept of maternal sensitivity, which is so central to antecedent research, has not been sufficiently defined and clarified. These problems and difficulties raise a number of serious questions concerning the nature of the conclusions that can be reached on the basis of the research to date. We have at best reached a stage at which we can formulate better and more refined hypotheses, and develop new measures which will improve our utilization of existing procedures. It follows that there is an immediate need for greater coordination in the planning and conduct of research in this area.

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INTRODUCTION

Attachment theory evolved from Freud's psychoanalytic perspective and was modified by John Bowlby, himself a psychoanalyst, who introduced modern ethological considerations into this area (Bowlby, 1969; 1973; 1980). Bowlby expanded the psychoanalytic procedures of assessing child parent relationships by introducing methods of behavioral biology. Subsequently, Mary Ainsworth successfully translated the new biological orientation and was able to gain new insights and accumulate further data in her pioneering project with mothers and infants in Uganda (Ainsworth, 1967). She subsequently applied this conceptual procedure to a small sample in the United States, in Baltimore. The procedure, known as the Strange Situation, is designed to assess the quality of infant-adult attachment. The field has subsequently been greatly influenced by Ainsworth's work. Her paradigm has opened the way to (1) a better understanding of the phylogenetic foundations of social emotional relationships between infants and their attachment figures; (2) a differential understanding of the development (ontogenetic) of the different qualities of infant-parent relationships, and (3) an understanding of cross-cultural differences as they relate to the presumed genetically programmed need for the development of attachments by infants to their caregivers.

Specifically, this chapter will focus on development of infant-parent attachment as assessed by means of the Strange Situation procedure; it will also address itself to issues bearing on the cross-cultural validity of this procedure. A thorough discussion and review of attachment research and theory has already been undertaken in previous works (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969; 1973; 1980; Bretherton & Waters, 1985; Lamb, Thompson, Gardner, Charnov, & Estes, 1984; Lamb, Thompson, Gardner, & Charnov, 1985; Waters & Deane, 1982). We shall therefore confine ourselves to only a very brief presentation of some of the historical and theoretical issues.

During the past two decades the Strange Situation procedure has been widely used by researchers in studying the development of individual differences in the quality of infant-adult attachments, and thus it has produced most of our empirical data in this area. Much of the research has been conducted in the United States. However, in recent years investigators in other countries - Germany, Holland, Israel, Japan and Sweden (Grossmann, Grossmann, Huber, & Wartner, 1981; Van IJzendoorn, Tavecchio, Goossens, & Vergeer, 1983; Sagi, Lamb, Lewkowicz, Shoham, Dvir, & Estes, 1985; Miyake, Chen, & Campos, 1985;

Lamb, Hwang, Frodi, & Frodi, 1984) have begun to employ the procedure. The growing number of cross-national studies in this area has been a welcome development for it is only by undertaking such studies that we can better understand the meaning of behaviors observed in the Strange Situation and their relationship to the broader concept of attachment. Data relating to attachment, as well as ideas about culturally specific differences in attachment have been presented at various conferences in Europe and the United States, and can be found in a very recent SRCD monograph (Bretherton & Waters, 1985).

Before proceeding to evaluate the findings of the most recent studies that have employed the Strange Situation procedure in different cultures, we would do well to describe briefly the procedure itself.

The Strange Situation procedure consists of eight standardized episodes. These can be summarized as follows (for a full account, see Ainsworth et al., 1978):

1. A brief introductory episode during which mother (M) and baby (B) are introduced to the experimental room.
2. M and B alone: M is nonparticipant while B explores.
3. Stranger (S) enters, converses with M, then approaches B; M leaves room unobtrusively at end of episode.
4. First separation episode: S's behavior geared to that of B.
5. First reunion episode: M greets and comforts B; M leaves again at end of episode.
6. Second separation episode: B alone.
7. Continuation of second separation: S enters and gears behavior to that of B.
8. Second reunion episode: M enters, greets and comforts B; meanwhile, S leaves room unobtrusively.

In their recent evaluation of the Strange Situation procedure as the principal method used in assessing parent-infant attachment, Bretherton and Waters (1985) and Lamb and colleagues (1984; 1985) discussed key issues including antecedents and consequences of attachment, stability of Strange Situation behavior, and the implications that cross-cultural research has for the understanding of behavior in the Strange Situation. These recent analyses raised important questions regarding the operationalization of attachment behavior and have contributed to sharpening some central questions in attachment theory and research. It is our purpose in the present study to extend the scope of the discussion by considering dimensions that have not yet been reviewed. In particular we shall focus on issues pertaining to the validity of the Strange Situation outside the United States.

We shall begin by examining various aspects of the distributions of classifications deriving from the procedure. These aspects include inconsistencies between and within countries, as well as inconsistencies in the subcategories of the B-type (secure) group. We shall follow with an attempt to provide alternative explanations for these inconsistencies such as the cultural differences in the psychological meaning of the Strange Situation procedure, the problems associated with implementing the procedure, and the problems in applying the classification system. We shall also offer an overview of the contributions of the studies that have assessed antecedents and consequences. Finally, an integrative view will be provided of cross-cultural research in which the Strange Situation procedure was used, and suggestions will be proposed for the directions that research in this area might take in the future.

DISTRIBUTIONS OF STRANGE SITUATION CLASSIFICATIONS

The vast majority of infants (all of the infants in the American samples reported by Ainsworth et al., 1978) can be classified in one of three categories that are based on the pattern of their behavior in the Strange Situation. According to this classification paradigm, the categories reflect secure attachments (group B), and two varieties of insecure attachments consisting of avoidant attachments (group A) and resistant attachments (group C). Currently, infants are classified into the three groups (or their eight associated subgroups) chiefly on the basis of their scores on several interactive behavioral dimensions. A full description of these interactive behaviors and a detailed account of the ABC classification system can be found in Ainsworth et al. (1978).

Table 1 contains information regarding the relative proportions of infants classified according to the traditional system in different countries. A close look at this table reveals three factors that deserve consideration in evaluating the meaning of Strange Situation behavior in various cultures: a) the distribution of infants among the classification groups across cultures; b) inconsistencies across distributions within cultures; and c) the differences in the way infants are distributed across the secure subgroups in various countries.

If we, like others in the field, use the aggregate of American samples associated with the Baltimore group as the "baseline" to compare with studies from other countries, several discrepancies become immediately apparent. In the Bielefeld study in Germany (Grossmann et al., 1981), a high proportion of infants were classified as belonging to the A (avoidant) group. Although the proportion of A-type infants found in the second study conducted in Regensburg (Grossmann, personal communication, April 1986) is not as great as in the Bielefeld study, it is nevertheless greater than the proportion found in the United States. By contrast, both in Japan (Miyake et al., 1985; Takahashi, 1986) and on Israeli kibbutzim (Sagi et al., 1985), an unusually high proportion of C-type infants was found. Moreover, a relatively high proportion of B4 infants was found in two of the Japanese samples (Miyake et al., 1985; Takahashi, 1986) as well as in the Netherlands (Van IJzendoorn et al., 1983). We have decided to treat the B4 subcategory, often referred to as reflecting dependent attachments, as a separate group because a number of researchers have recently questioned whether these infants ought actually to be considered as being secure in their attachment relationships (Sagi et al., 1985; Van IJzendoorn et al., 1984). This issue will be considered in detail in a later section.

A second aspect that deserves our consideration has to do with the inconsistencies across distributions within cultures. Although the findings of the two studies in Germany differ from the American "baseline", it is noteworthy that the results of a third study conducted by Beller and Pohl (1986) is at variance with the Bielefeld and Regensburg data. As can be seen, the data in this sample are closer to the American data, so that the cross-distributive inconsistency among samples may be found in Germany.[2] Another inconsistency of the same kind is evident when Miyake and Takahashi's two cohorts are compared with another Japanese sample studied by Durrett, Otaki, & Richards (1984). Thus in the Sapporo cohorts no A-type infants were found, whereas 14 percent of the Tokyo infants were classified as avoidantly attached. Moreover, a higher proportion of infants in the Tokyo study were classified as B4 (dependent) than in the Sapporo study.

An additional illustration of lack of consistency within a culture can be found by comparing the distribution of Israeli kibbutz infants with that of Israeli urban infants attending daycare centers. The study of infants in Israeli cities revealed a distribution which is at variance with the one found in kibbutzim. A higher proportion of infants were classified as secure in the urban sample than in the kibbutz sample. A possible explanation for the variation within the Israeli sample could be attributed to the fact that kibbutz infants, residing in communal sleeping houses, often experience delays in adults' responding to their distress during the night. Perhaps a larger proportion of kibbutz infants perceive adults as less responsive to their signals which may in turn lead to the formation of insecure attachments. Except for the Israeli

Table 1
Distributions of infant-mother attachment classification in cross-national attachment research

	Insecure Avoidant		Securely attached			Dependently attached	Insecure resistant	
	A1	A2	B1	B2	B3	B4	C1	C2
West Germany[a] Bielefeld (n=49)	19 (38%)	5 (10%)	0 (0%)	10 (20%)	5 (10%)	1 (2%)	4 (8%)	2 (4%)
West Germany[b] Regensburg (n=54)	5 (9%)	12 (22%)	1 (2%)	11 (20%)	10 (19%)	8 (15%)	3 (6%)	0 (0%)
West Germany Berlin (n=40)	4 (10%)	3 (8%)	5 (13%)	8 (20%)	16 (40%)	2 (5%)	1 (2%)	1 (2%)
Holland (n=136)	33 (24%)	0 (0%)	35 (26%)	21 (15%)	20 (15%)	22 (16%)	5 (4%)	0 (0%)
Sweden (n=51)	4 (8%)	7 (14%)	6 (12%)	9 (18%)	20 (40%)	3 (6%)	1 (2%)	1 (2%)
Israel[c] kibbutz (n=83)	0 (0%)	7 (8%)	2 (2%)	21 (25%)	17 (20%)	7 (8%)	20 (24%)	8 (8%)
Israel city (n=36)	0 (0%)	1 (3%)	6 (17%)	11 (31%)	10 (28%)	2 (6%)	5 (14%)	1 (3%)
Japan Sapporo[d] cohort 1 (n=29)	0 (0%)	0 (0%)	2 (7%)	9 (31%)	5 (17%)	1 (3%)	4 (14%)	3 (10%)
Japan Sapporo[e] cohort 2 (n=30)	0 (0%)	0 (0%)	19 for B1,B2,&B3 (63%)			3 (10%)	3 (10%)	3 (10%)
Japan Sapporo[f] cohorts 1&2 (n=60)	0 (0%)	0 (0%)	0 (0%)	9 (15%)	30 (50%)	2 (3%)	19 (32%)	0 (0%)
Japan Tokyo (n=36)	4 (11%)	1 (3%)	1 (3%)	4 (11%)	8 (22%)	11 (31%)	4 (11%)	3 (8%)
USA Baltimore[g] (n=106)	12 (11%)	10 (9%)	10 (9%)	11 (10%)	45 (42%)	4 (4%)	6 (6%)	7 (7%)

Notes.

Distributions are based on references cited in Table 2 and/or personal communication and/or unpublished data. Because fathers were not included in all samples (for information see Table 2), only mothers are discussed here.

Table 1 (cont.)

a) 3 infants were not classified
b) 4 infants were not classified
c) 1 infant was not classified
d) 4 infants were classified as "pseudo-C", and 1 infant as secure (B) without subgroup classification.
e) 1 infant was classified as "pseudo-C", and 1 infant as insecure (C) without subgroup classification. No B-subclassifications are provided because the available publications do not specify them. Miyake has made his data available to us, but for many infants final classifications still need to be established. We decided not to use the distribution specified by Lamb et al. (1985), because it seems that Miyake and his associates are still engaged in rating and data analysis of this cohort. Further information regarding the Sapporo distributions is available in Miyake (1984/1985) and Ujiie (1984/1985).
f) Takahashi (1986) used a somewhat different method than Miyake in reclassifying the infants, and this may account for the differences in final classifications. Also Takahashi has an additional infant in her total sample.
g) 1 infant was classified as A-type without subgroup classification. In the first subsample (*n*=23), the B4 subgroup was not used.

samples, for which our explanation is at any rate speculative, researchers have been unable to find a satisfactory explanation for these inconsistencies within cultures.

A third aspect that must be considered in evaluating the meaning of Strange Situation behavior is the extent to which the distribution of the subgroups within the secure categories is similar across cultures. It should be noted that such similarity is not always in evidence. From Table 1 it is clear that in the United States most of the variance within the secure group (B1, B2, B3) is accounted for by the B3 subgroup. In a number of other samples, however, the internal variance may be explained in a somewhat different way. First, in the initial Sapporo cohort and in the Bielefeld study, the B2 subgroup accounted for the largest proportion of variance within the secure group.[3] Second, in the Regensburg sample and in the two Israeli samples, the B1 and B2 subgroups together accounted for most of the variance. Third, in the Netherlands, it was the B1 subgroup that accounted for most of the variance.[4] And finally, in the Berlin sample, the proportion of variance accounted for by the B3 subgroup was almost equal to that accounted for by the B1 and B2 subgroups combined. In general, when we examine the distributions across the secure subgroups, we find a lack of consistency in the patterns. The different types of inconsistencies in the distributions bear looking into, and we shall attempt to account for them in the section that follows.

ALTERNATIVE EXPLANATIONS FOR THE INCONSISTENCIES IN THE DISTRIBUTIONS

Meaning of Strange Situation

The inconsistencies in the distributions may raise a number of questions concerning the appropriateness of the Strange Situation procedure as accurately assessing attachment behaviors and of evaluating the quality of the infant-primary caretaker relationship across cultures. Recall that the Strange Situation procedure was designed to induce mild separation distress in infants. It is not at all clear to what extent the procedure elicits equivalent degrees of distress in infants from different cultures. Some infants may show greater distress than others even in the pre-separation episodes of the procedure. It is possible, as Connell and Goldsmith (1982) have contended, that in order to more fully understand behavior in the Strange Situation we need to assess infants' primary appraisal of the contextual shift they experience. Specifically, Connell and Goldsmith (1982) refer to the initial evaluation made by infants of the possible consequences that the change in the environment may have for them (the environment in this case consisting of the infant's exposure to the Strange Situation). The "conclusions" that infants reach during such primary appraisal encounters may vary. It may be that infants in different countries appraise their experience differently - for instance many Japanese and kibbutz children reacted to the Strange Situation with intensified distress while among many German infants the procedure failed to elicit sufficient distress even in the separation episodes.

Some indirect evidence, related to the initial primary appraisal made by infants, emerges from Miyake and Takahashi's studies in Japan (Miyake et al., 1985; Takahashi, 1986). In these studies it was found that Japanese infants who were classified as "pseudo-C" (Miyake's term) or "inconsistent-C" (Takahashi's term) tended to respond similarly to C-type (resistant) infants in the second reunion, but were more like B-type (secure) infants in previous episodes in displaying little resistance. Miyake and colleagues suggest that pre-separation episodes do in fact play a significant role in determining infant behavior in subsequent episodes. They state that differences between B and non-B infants were evident even before the infants were separated and reunited with their mothers. Furthermore, it was found in the kibbutz study (Sagi, Lamb, & Gardner, in press) that infants classified as belonging to the B- (secure) category were more friendly toward strangers than C-type (resistant) infants in the sociability assessments that were conducted immediately prior to the Strange Situation. It should be noted that the C-type babies were the very same infants who had exhibited great distress in the pre-separation episodes (Sagi et al., 1985). Thus it is possible that the sociability assessment, undertaken when the infant was initially exposed to a friendly, unfamiliar adult, influenced infant behavior in early episodes, with the consequence that the infants interpreted the total psychological meaning of the procedure as being more stressful. Working along these lines, Sagi and Koren (1986) are currently undertaking a cross-national comparison between the various samples in order to determine whether Strange Situation behavior in pre-seperation episodes is simular across cultures. Should it be found that Strange Situation behavior in these episodes differs across cultures, this would suggest that pre-separation episodes should receive more serious attention since the "opening line" in the Strange Situation for infants may be different. This in itself may severely bias infant behaviors in subsequent episodes and in the final attachment classifications. The preliminary data from this project suggests that such may be the case (Sagi & Koren, 1985).

The focus to date has centered on infant behavior and on the primary appraisal made by infants. Little attention has been devoted to adult behavior in and appraisal of the Strange Situation. If we assume that infant attachment behavior reflects prior reciprocal interactions between infants and adults, future research must turn its attention to adult behavior in the Strange Situation and to the meaning attributed by adults to this procedure. Some promising information on adults is now becoming available (Beller & Pohl, 1986; Bretherton, 1985; Main, Kaplan, & Cassidy, 1985) and this is an important step in the field.

Implementation of the procedure

In one of the most recent reviews of the subject (Lamb et al., 1985), it was concluded that "cultural variations are probably not due to the measurement variability because all non American researchers have sought to insure comparability with American practices" (p. 183). A close examination of Strange

Situation research conducted in various countries suggests that this may not be the case. The problems related to the implementation of the procedure may account for more variability in the distributions than was once believed to exist.

A basic difficulty in this regard is that many researchers fail to report modifications made in response to problems encountered while employing the procedure. Thus it is difficult to understand the possible relationships between measurement variability and the outcomes that are obtained. Takahashi (1982; 1986) was the first to explicitly modify the Strange Situation procedure. She did so following her observations of maternal unease during segments of the procedure. Basing herself on a pilot study, she chose to omit the episode in which the child was left alone, for the reason that the Japanese mothers hesitated to leave their children unattended in the experimental room. Although Takahashi must be commended for her sensitivity to the signals emitted by Japanese mothers, she did not discuss the implications that modifying the procedure might have had on the validity of the measurements and on the potential difficulties of comparing her data with other studies. It is only recently that researchers have begun to understand that procedural modifications raise validity issues. For example, in the Israeli kibbutz study (Sagi et al., 1985), a considerable number of Strange Situation sessions were terminated prematurely either without any episode of separation, or only after a brief one, because of the child's inconsolable distress. An attempt was therefore made to classify the infants on the basis of the limited information that was available, and most of the infants were classified as C2 because of their passivity and failure to gain comfort from the adult. The large number of C-type (resistant) infants is in fact accounted for by this group of infants who manifested an unusual degree of distress and who were extremely difficult to soothe. It should be pointed out that when abbreviated sessions were excluded from the analyses, the distributions of infants across attachment categories no longer deviated from the norms in the United States. It follows, therefore, that we do not know whether these C-type infants were clearly insecure or whether the procedure was inappropriate. Clearly, one can speak of the Strange Situation as being a valid instrument for assessing individual differences only if it creates a similar psychological experience for all infants (Ainsworth et al., 1978; Lamb et al., 1984).

We have to consider the possibility that the distress created in the Strange Situation for this subgroup of infants was so intense that their experience was qualitatively different from that of infants who were exposed to the Strange Situation in its entirity. The issue is brought home even more strongly when we consider studies which pedantically replicated the procedure as it was originally designed by Ainsworth. As case in point, recall that Miyake and associates (1985) also found a disproportionate number of infants to be resistantly attached. However, it seems that Japanese infants experienced psychological stress to an extent that may have made modification of the procedure necessary (Miyake, personal communication, July 1985). Recently, Takahashi (1986) reporting on the same Japanese subjects, indeed indicated that six out of sixty mother-infant pairs skipped episode 6 if the infant strongly resisted the mother's withdrawal and the mother was reluctant to leave the room. In this regard, Takahashi proposes that due to culture-boundness of the Strange Situation procedure, the level of stress experienced by Japanese infants and mothers will almost certainly exceed the acceptable cultural level. Furthermore, although the matter awaits systematic documentation, the authors of this chapter came away from the observation of the Japanese Strange Situation sessions with the impression that a precise implementation of the procedure as originally designed might have been very depressing for the child, so that the meaning of the procedure was perhaps different from that experienced by the American mother and child.

All in all, the extremely high level of distress displayed by Japanese infants during separations, coupled with mothers' unquestioning compliance with the researchers (Miyake, personal communication, July, 1985), may have even created a situation which was not only strange but even bizarre for both infant and mother. Our "clinical" impression, based on our observations of Japanese infants in the Strange Situation, is that the Japanese experience may well be consistent with Bronfenbrenner's view (1979) that the study of child development is often detached from the ecological context in which children live.

Observations of Strange Situation sessions in other countries, as well as personal communication received from leading investigators in this area (Grossmann, July 1985; Miyake, July 1985), suggest that procedural aspects - including size and location of experimental room, amount and type of available stimuli, degree of social desirability evoked in parents as a result of their being approached in different ways immediately prior to the Strange Situation assessment, and the different perceptions of the investigators themselves in regard to the interpretation of the degree of stress which is expected to be evoked by this procedure etc. - may account, at least in part, for the differing distributions. For instance, questions similar to those raised by us about the appropriateness of the procedure in both the kibbutz and Japanese contexts (because of the increased number of C-type infants) may have to be asked in regard to the large number of A-type (avoidant) infants found in the Bielefeld sample in Germany (Grossmann et al., 1981). Once again, although not yet systematically documented, it seems that the duration of episodes was extented, and the observation rooms were very spacious and filled with stimuli, both of which may have distracted the infants from the potential stress, supposedly induced by the procedure. It is possible that the minor alterations of the experimental procedure created an atmosphere which failed to evoke sufficient distress in the German infants. Because previous reviews in the field have taken for granted that the procedure was uniformly implemented, little attention has been devoted to this point. We have ample evidence suggesting that this issue is no longer trivial. Ongoing research in this direction may yield important information (Sagi & Koren, 1985). It is important to point out, however, that Grossmann (personal communication, April 1986) argues that the large proportion of A-type (resistant) infants is not due to procedural modifications. He emphasizes that the German culture dictates from a very early stage of socialization the expectation according to which feelings of hostility should be hidden. Thus much of the avoidant behavior German infants displayed was not simply due to technical distractions of the procedure, but it was rather a genuine mode of expressing anger in an avoidant fashion. In order to better understand the proposed explanations, more ethnographic information about culturally idiosyncratic interpretations of behavior is needed.

Methodological issues of classification

The classification of infants according to attachment categories is not a new issue. The subject has recently been discussed at length (Lamb et al., 1984; Lamb et al., 1985) and a detailed consideration of the issue here would take us beyond the scope of this chapter. Instead we shall concentrate on a number of related aspects that have been highlighted in the available cross-cultural research. Researchers have encountered difficulties in accounting for results which are at variance with norms in the United States. Because their expectations of the Strange Situation are greatly dependent on Ainsworth's findings, most researchers outside the United States have attempted to provide explanations which would on the one hand account for the deviant distributions, and on the other hand be consistent with the traditional view regarding the relationship between early infant-mother interaction and attachment behavior. This is a rather difficult task for no one is yet willing (very likely with some justice) to accept the idea that infants in some countries are more insecure than infants in other countries despite the fact that strict adherence to the interpretation of the Strange Situation would eventually result in just such a conclusion. However, this conclusion would appear unwarranted, especially in light of Hinde's (1982) biological view of adaptation, which suggests that there is no single adaptive pattern of infant-parent relationship. A serious discussion of attachment must consider the ecological context in which children live. Therefore, in various countries there must be a wider range of acceptable infant behaviors which may be conceived of as secure when the Ainsworth system of classification is applied. In other words, the fact that infants are classified as types A (avoidant) or C (resistant) in certain countries may not necessarily reflect insecure relationships with their parents.

It is interesting to observe the manner in which various researchers have attempted to deal with this difficult conceptual and methodological issue. For example, recall that Grossmann and colleagues (1981) found an unusually high proportion of avoidantly attached infants in their North German sample. In order to adhere to the traditional view of how attachment relationships are formed, as well as to avoid having their findings interpreted as confirming to certain prejudices about the German people (e.g., rigidity in parenting), these investigators proposed that the meaning of the A-type behavior pattern should be widened. In their recent writings, Grossmann and colleagues (in press) reported that some of the A-type infants displayed "good moods" in the Strange Situation, a circumstance which suggested that a subsample of the A-type infants may not be insecure.

Following a similar strategy, Miyake and colleagues (1985) and Takahashi (1986) introduced the terms "pseudo-C" and "inconsistent-C" respectively in referring to infants who manifested the typical C-type (resistant) behavior pattern during the second separation and reunion but behaved like B-type infants in earlier episodes. In their closing remarks, Miyake et al (1985) concluded that they

> *"do not consider the classification of Japanese infants as C to reflect a greater proneness to be insecurely attached. It will be necessary for us to review for our Japanese mothers and babies which patterns of attachment behaviors in the Strange Situation reflect emotionally unstable or problematic mother-infant interactions in the first year of life"* (p. 294).

Takahashi (1986) also states that what might be seen in episode 6 as an insecure behavior could be characteristic of infants whose everyday attachment to the mother is basically secure. On the basis of cross-cultural research, it would therefore appear that there is no single and conclusive meaning to the various attachment categories proposed by Ainsworth et al. (1978). Hence it would be wise to consider the meaning of these classification categories from a wider perspective. In a recent monograph Bretherton and Waters (1985) related to this issue in the following way:

> *"It may not be legitimate to interpret Strange Situation classifications in other cultures as they are interpreted in the United States. However, only extensive cross-cultural data on parent-infant interactions in the home and in other contexts will provide clarification of this issue"* (p. 231).

A related issue is the manner in which different investigators have combined subgroups to form more general groups. Different scholars attribute different meanings to the same subgroup. Consequently, a given subgroup may be included under conceptually different attachment classification groups. This inconsistent assignment may have serious implications for the way in which investigators interpret their results, especially in their attempts to explain relationships with external correlates. Let us consider a number of examples.

In their Tokyo sample, Durrett et al. (1984) decided to include the B4 (dependent) subgroup as part of the secure B category. Although this is certainly consistent with most of the research in the field, and with the original classification system as designed by Ainsworth et al. (1978), it nevertheless creates serious difficulties in two regards: (1) a higher proportion of B4 infants was found in this sample (11 out of 24) than in most of the American samples in which the B4 subgroup was considered as secure; (2) this relatively large number of B4 infants should be discussed in the context of other Japanese studies where a disproportionately large number of C-type (resistant) infants were found (Miyake et al., 1985; Takahashi, 1986). The last is an especially significant finding in the light of recent contentions that B4 infants are more similar in some behaviors to C-type infants than to B-type infants (Van IJzendoorn et al., 1984; Sagi et al. 1985). For example, B4 like C infants are slower to calm when compared with other B subgroups and rarely return to active exploration after being separated from their mothers. Overlooking this issue, Durrett and associates went on to formulate their hypothesis that secure babies had mothers who perceived their husbands as offering more support than did the mothers of insecure infants. Thus, in testing this hypothesis, the secure group consisted of a large number of B4 infants who were not necessarily secure.

A somewhat similar example is furnished by the research conducted in the Netherlands where subgroups were combined differently in two studies. In their first study Van IJzendoorn et al. (1983) attempted to investigate the relationship of the classification obtained in the Ainsworth Strange Situation with a measure they had devised in order to assess maternal perceptions of infant security ("Perceived Security", see also Tavecchio & Van IJzendoorn, chapter 2, this volume). For the purpose of analysis, the investigators combined subgroups A1 and A2 to form a general insecure group. They also brought together B1, B2, and B3 to form a general secure group, and combined B4 and C into an additional insecure group. It should be noted, however, that the latter group consisted of 12 B4-type (dependent) infants and only one C1 (resistant) infant. This last group was thus composed mainly of infants whose attachment status is often regarded as secure by other researchers. This in itself would not be disturbing particularly in consideration of recent doubts about whether B4 infants should be regarded as secure- had Van IJzendoorn and colleagues (1984) been consistent in the way they combined subgroups in their subsequent study.

In their second study, Van IJzendoorn et al. combined B4 (dependent) and C-type (resistant) infants so as to form one insecure group; and once again there were very few C-type infants. In the same study, in order to relate attachment to external correlates (i.e., maternal sensitivity), the B4 subgroup was combined with the other B subgroups, whereas the C-type infants were grouped with A-type infants. It is important to note that in the first study, A (avoidant) and B (secure) were perceived as equally secure by their mothers, suggesting that A and B infants are indistinguishable, at least on this index of maternally perceived security. Thus, combining A with C and B with B4 creates a conceptual mismatch between the first and second studies. The matter is further complicated by the fact that in one subsample of the same Dutch project, B-type infants were found to be different from B4 infants on a number of important background variables. So as to maintain a greater consistency in the series of analyses, and taking into account the recent criticism challenging the classification of B4 infants as secure, it is important to treat the B4 subgroup as a separate group, when testing for possible lawful relationships with other external variables. This is particularly important if we want to obtain a better understanding of the meaning of the relatively large number of B4 infants found in the Dutch sample.

A final illustration of the problems associated with the manner in which groups are combined is furnished by the German studies. In the Bielefeld follow-up study (Lutkenhaus, Grossmann, & Grossmann, 1985), three-year old children, who had previously been classified as B-type(secure) in the Strange

Situation were found to be more willing to interact with unfamiliar adults than their same-aged counterparts who had earlier been classified as A-type (avoidant). In the same study, on another measure, a global "insecure" group (composed of children previously classified as A's or C's) was found to decrease their speed of performance when compared with B children who increased their speed of performance when confronted with a task designed to measure children's potential reaction to failure. There are two problems related to the fact that children, previously classified as secure, were contrasted with peers previously classified as avoidant on one measure while on a second measure they were contrasted with a combination of children who were previously classified as either avoidant or resistant. First, while the small number of C-type infants made it impossible to statistically test differences between A-type (avoidant) and C-type infants, inspection of the data revealed that the scores of preschoolers previously classified as avoidant and resistant were at opposite ends of the scale for both tasks, suggesting that meaningful differences between these two subgroups may exist. The combination of children, previously classified as avoidant and resistant into a global insecure group, made it impossible to determine the relative proportion of variance accounted for by each of these subgroups. Secondly, this combination strategy was contradictory with the initial finding of this study, and with Grossmann et al.'s previous contention that the behavior of some avoidant infants represents a culturally adaptive style of behavior.

In Regensburg, infants who were assessed in the Strange Situation with their mothers and fathers at twelve and at eighteen months of age were followed-up at the age of five. In the follow-up study the investigators adopted a somewhat novel approach in combining classification groups in the Strange Situation (Suess, Escher-Graub, & Grossmann, 1985). They combined the classifications assigned to infants observed with mother and father and assessed whether the combination of attachment classification to both parents predicted preschool behaviors. In analyzing the data, four attachment groups were created: infants avoidant of both parents; infants secure with both parents; infants avoidant of mother but secure with father; and infants secure with mother but avoidant of father. C-group infants were not included in these analyses because they were too few in number. This is certainly an interesting and most valuable approach to comparing groups, and is consistent with Bretherton's recent assertion that further research is needed to assess the joint effect of multiple attachments (Bretherton, 1985). Unfortunately, no differences were found on the California Q-Set when this design was used.

It is important to point out, however, that these are only preliminary analyses and further analyses are currently underway. At present these type of comparisons are still difficult to make in this area of research because the projects undertaken to date have not been designed in an a priori fashion to examine joint effects. They are therefore based on relatively small samples, a fact that makes it difficult to detect differences among groups. It may be possible that this was the reason that the Regensburg investigators were unable to find differences between the four comparison groups.

Further analyses were conducted to assess whether infants who had one secure attachment relationship (with either mother or father) differed from infants who were avoidantly attached to both parents. Only one significant difference was found between these two groups. Secure infants scored significantly higher on the ego-resiliency scale of the California Q-Set, but no significant differences were found on the remaining two subscales of ego-control and field dependence. Recall that Grossmann, Grossmann, & Schwan (in press) suggested that the increased number of A-type infants may have been the result of German parenting strategies aimed at enhancing independence in young children. Thus, many of the infants classified as A were not necessarily insecure. Why, then, would one expect German infants classified as A to score lower than B-type infants on a measure of ego-resiliency? It is possible that this result was obtained by chance, especially in view of the fact that the group which was avoidantly attached to both mother and father was relatively small ($n = 6$), and two of the three scales on the California Q-Set failed to reveal significant differences between subgroups.

In sum, the attempts of Grossmann and colleagues to provide a unique and culturally specific explanation for the high proportion of A-type infants in their German samples is at variance with their methodological strategy of combining A and C infants into a single insecure group. As a consequence of this strategy, the uniqueness of the A group may have been masked, and with the resulting loss of a unique contribution of the German data to attachment theory. As was proposed in regard to the B4-dependent infants in the Dutch sample, it might be more fruitful to consistently treat the A-type avoidant group in Germany as a separate entity when making comparisons with other classification groups for a variety of external correlates. In fact, as stated before, further analyses are presently being conducted in Germany (Grossmann, personal communication, April 1986) which should shed more light on this issue.

An additional aspect to be considered regarding the issue of classification is the manner in which the different episodes are weighted in determining the final attachment categories. This issue is not unique to cross-cultural research since inconsistencies exist in related American research. Inspired by the procedure of Ainsworth and her colleagues, all researchers in the field use the reunion episodes as their principal criteria for determining classification. However, while the original classification definitions refer to other episodes as well, some researchers are more gestalt-oriented in their approach than others. For example, Israeli and Swedish researchers took into consideration all of the episodes in the Strange Situation procedure, but the reunion episodes were given greater weight. Thus, the final classifications were based on the total configuration in which infants organize their behavior during the procedure. On the other hand, the researchers in the studies conducted in Bielefeld, and Regensburg, did not rate the pre-separation episodes on the interactive scales, so that their classification of infants was almost exclusively based on the reunion episodes. Of course, it is possible that they may have incorporated their impressions of other episodes in the final classifications and Grossmann (personal communication, April 1986) informs us that indeed this is the case. The extent to which these procedural differences may have affected the meaning of the classifications that were made is as yet unclear, but this may prove to be an important confounding variable, especially in consideration of the different distributions found in the various countries. Repeated classifications of the same tape made by investigators with different training background could provide important information pertaining to the relevance of this issue.

A final issue which deserves mentioning is the degree to which the existing classification system, based on discrete categorical rather than continuous assessment, best reflects the meaning of Strange Situation behavior. It appears that the detailed information provided by the interactive scales is not taken into consideration sufficiently in determining the final attachment profiles of infant-adult relationships. Critical evaluations of the classification of the Strange Situation have suggested that an approach, which was less bound to a particular typological characterization of individual differences of attachment behavior (i.e., insecure-avoidant, insecure-resistant, and secure) would facilitate a more thorough understanding of attachment mechanisms. In light of the recent work of Gardner, Lamb, Thompson, and Sagi, (in press) in which the interactive scales are heavily weighted, it would appear that there are substantial cultural differences in the patterning of Strange Situation behavior, and that the existing classification system may mask meaningful individual variation. Further analyses, employing a structural modeling approach, and deploying multivariate procedures to uncover relevant dimensions within the Strange Situation, are currently underway with samples obtained in Germany, Israel, Japan, the Netherlands, Sweden, and the United States.

EXTERNAL CORRELATES OF ATTACHMENT RESEARCH

Antecedents

One of the major purposes of attachment research is to discover lawful relationships between early caregiver-infant interactions and subsequent styles of infant behavior. Researchers in this field are attempting to explain how patterns of early relationships predict children's adjustment at later stages in life. The research that describes assessment of antecedents in the field has been reviewed by Bretherton and Waters (1985) and Lamb et al. (1985) and will not be repeated here. Instead in this chapter we shall consider only some of the unique problems associated with cross-cultural research in an attempt to better understand antecedents of attachment behavior. We have demonstrated just how complicated is cross-cultural research in this area, even without directly investigating the predictive validity of various antecedents. The problems discussed so far are certainly relevant to the study of antecedents.

Although all cross-cultural investigators have included considerations of antecedents in one form or other, there is a lack of uniformity in the type and depth of the measures used in assessing the relationships between early behavior and attachment functioning systems. Thus, when we try to integrate the available research, we find it difficult to create a coherent picture. Table 2 indicates that the scope of antecedent variables that have been included is quite extensive. The table includes a variety of variables including: maternal sensitivity, the Brazelton neo-natal assessment scale, parental attitudes about child-rearing, perceived infant temperament, maternal anxiety questionnaires, parental questionnaires of infant activity level at home, physiological measures, parental role division, and various questionnaires related to family background variables. Researchers in various countries have employed different combinations of these antecedent measures thus making it difficult to compare their findings. Comparable information about antecedent behavior could prove to be very important in helping to untangle the origin of the differing distributions found in the various countries.

Table 2
Description of data sets

Researchers*)	Country assessed	*n*	Adults	Age of SS assessm.	Other correlates assessed
Ainsworth et al. (1978)	USA	106	Mothers	12	Infant-mother interaction at home
Beller & Pohl (1986)	Germany W.Berlin	40	Mothers	12	Maternal sensitivity, Revised SS
Durrett et al. (1984)	Japan Tokyo	36	Mothers	12	Perceived support of husbands
Grossmann et al. (1981)	Germany North	49 46	Mothers Fathers	12 18	Home observations Maternal sensitivity, Brazelton scale, free play, Bayley tests, adult attachment, and various outcome measures during pre-school and school years
Grossmann et al. (in progress)	Germany South	54 48	Mothers Fathers	12-18 12-18	Peer play, Empathy test, parent interview, observations in pre-school and school, peer play, empathy test, California Q-Sort and various preschool and school outcome measures
Lamb et al. (1984)	Sweden	51 51	Mothers Fathers	11-13 11-13	Home observations, sociability assessment, parenting attitudes
Miyake et al. (1985)	Japan	29 30	Mothers (Cohort 1) Mothers (Cohort 2)	12	Maternal anxiety questionnaires, prenatal maternal questionnaire, infant temperament and reactivity, infant activity level at home, stranger separation distress, physiological measures, free play reactions to auditory & visual stimuli, object permanence
Sagi et al. (1985)	Israel Kibbutzim	83 83 84	Mothers Fathers Metaplot	11-14 11-14 11-14	Home observations, background variables, sociability assessments, empathy test, I.Q., locus of control, perception of parental roles, play behavior, preschool teacher assessments
Sagi et al. (1985)	Israel City	36	Mothers	11-14	Background variables; sociability assessment
Van IJzendoorn et al.(1984)	Holland	136	Mothers	12-24	Free play, maternal sensitivity (Ainsworth scale), Perceived Security, background data, California Q-Sort, instruction tasks, intelligence tests.

Table 2 (cont.)

Note. Information is based on cited references and/or unpublished data and/or personal communication with the various investigators.

Traditionally the central construct of antecedent research has been the concept of maternal sensitivity and responsivity. Researchers outside the United States have adopted this approach, and incorporated various measures of maternal sensitivity and responsivity when assessing antecedents (Grossmann et al., in press; Van IJzendoorn et al. 1983; 1984).

In a subsample of Dutch infants (*n*=24) maternal sensitivity was assessed by employing a procedure which measures maternal responsivity to infant signals in free play sessions (Van IJzendoorn et al., 1984). The findings were similar to those in an American sample (Ainsworth, Bell, & Stayton, 1974), where the mothers of B-type infants received higher sensitivity scores than the mothers of A or C-type infants. Because the sample size was small, it was not possible to statistically test for differences between the A (avoidant) and C (resistant) groups. Further analyses revealed no differences between B4 (dependent) and other B-type infants on maternal sensitivity scores. The relatively large number of B4-type infants found in the distribution in the Netherlands stimulated the Dutch researchers to investigate additional antecedents which might help explain how the B4-type relationship is formed. Ainsworth has suggested that physical inaccessability of attachment figures may also lead to the formation of insecure attachment patterns. In order to address whether B4 infants have mothers who are less physically available than other B-type infants, background information related to maternal-child separations was collected for a subsample of Dutch infants (*n*=59). Because the researchers hypothesized that physical separations may have a different meaning for infants of working and non-working mothers, they analyzed the data for these groups separately. For infants of working mothers, no differences were found between the B4 and the other B subgroups on a measure of physical inaccessability. When we look however, at the results for infants of housewives, they suggest that the B4 infants experienced more separations than other B-type infants. While this finding is interesting, it should be interpreted with caution until replicated in other samples.

In their attempts to account for the large number of A's in their sample, Grossmann and associates had to take a wider perspective of maternal sensitivity in order to avoid the unwarranted conclusion that there exists a "phenomenon" of insecurity in Germany. This conclusion would be inconceivable from the universalistic point of view of ethological theory. An alternative explanation offered by Grossmann et al. (in press) proposes that the behavior of some of the mothers of avoidant infants is not a reflection of maternal insensitivity but the outcome of childrearing norms emphasizing independence. If this is in fact the case, at least some of the infants, originally classified as avoidant, should not be considered insecure from the German cultural point of view. Subsequently, Grossmann and associates developed a more detailed method of coding Strange Situation behavior in which they suggested that in fact A-type infants should not be considered as a homogeneous group but as two distinct groups: one displaying "good moods" in the Strange Situation hence conceived as secure, and the other displaying "bad moods" in the Strange Situation and hence conceived as insecure. Grossmann et al. suggest that culturally prescribed emphasis on independence training may be appropriate for explaining the behavior of the first group while insensitive mothering may be appropriate for the latter.

At this point we must ask whether the decision of a non-American mother (or other adult) to respond to her infant's signals in a way that differs from that of American mothers, signifies indifference or a lack of responsiveness to her infant's signals. It is possible, as Hinde (1982) has suggested, that there are multiple styles of behavior which could be considered adaptive within a given cultural context. Phenomenologically, in the case of German society, for example, mothers tend to place a high value on independence. Therefore, in this context, there are reasonable grounds for Grossmann's statement that if we were to ask German mothers to evaluate the behavior of B3 infants, the subgroup considered most healthy by Ainsworth (1978), they would label the infants as "spoiled". Currently, this explanation is only speculative and we need to obtain more systematic information supporting this notion of independence. Furthermore, if this argument about the role of independence is true, future research must show that the mothers of A (avoidant) infants differ from the mothers of B (secure) infants in their strategies for encouraging independence but not in their sensitivity to infant signals.

When we come to consider the relationship between Strange Situation behavior and various antecedent factors, we find that there are dissimilarities in definitions, tools and measurement strategies that characterize the available cross-cultural research. An exception, however, is the contribution emerging from designs that compare the attachments of infants to their mothers with their attachments to their fathers.

Although the comparison of the behavior of infants toward their mothers and fathers does not reflect a classical design which can be easily replicated to assess antecedent effects, antecedent components are nevertheless indirectly built into such comparisons, since differences in infant behavior toward both parents must lead to the conclusion that specific adult-infant relationships had contributed to such differences. Infant attachments to both mothers and fathers were assessed in four cultural contexts: Germany, Sweden, Israeli kibbutzim and the United States. It was found that infant attachments to mothers were not associated with infant attachments to fathers (Grossmann et al., 1981; Lamb et al., 1978; Main et al., 1985; Sagi et al., 1985). More specifically, infants are often securely attached to one parent while insecurely attached to the other parents. This suggests that the processes contributing to the formation of attachment relationships with different adults are independent of one another.

Although difficult to accomplish, a thorough definition and assessment of antecedent variables would greatly facilitate progress in this area by enabling researchers to compare samples from various cultures. And though the model of the design involved may be simplistic, the comparison of mothers and fathers furnishes a fair illustration of the contribution that uniform assessment could make to the general understanding of attachment. This type of research may provide ample evidence to support the notion cross-culturally that it is the specific adult-child relationship that determines the quality of infant-adult attachments.

Finally, it is important to point out that much as we may seek uniformity in definitions and assessment procedures, there will always be a place for research in settings whose design is so idiosyncratic that there comparibility is unattainable, but whose contributions to the understanding of antecedents is nevertheless considerable. For example, the communal sleeping arrangements found in some Israeli kibbutzim make it possible to investigate traditional antecedent variables, including the quality of adult responsiveness to infants, signals at night, and the promptness of such response to infants' distress. This test has not yet been undertaken and it would therefore be a goal of future research to take advantage of the benefits offered by this "natural laboratory" (Beit-Hallahmi & Rabin, 1977) in directly assessing some of the antecedents that have been hypothesized as central issues in attachment theory.

Follow-up studies

Based on the assumption that relationships formed early in life have an impact on the quality of later functioning, one of the major purposes of attachment research is to develop assessment tools which will predict future behavior. A central issue addressed by researchers in this area is the degree to which the Strange Situation procedure has predictive validity.

Whereas results of follow up studies of the Strange Situation in America have been reported (Bretherton & Waters, 1985; Lamb et al., 1985) as the most powerful branch of attachment research - when compared with studies of antecedents and research assessing temporal stability - cross-cultural research has not yet reached a stage in which definitive conclusions can be made. Although follow up studies have and are still being conducted in Japan, Israel, Germany and the Netherlands, the data are too preliminary for a satisfactory review. This battery of studies is crucial in order to untangle questions raised in this chapter. A better empirical understanding of the distributions found in cross-national attachment studies and the meaning behind infant behavior in the Strange Situation can be achieved when we have more information about the predictive validity of the procedure within different cultures.

CONCLUSIONS

This chapter has dealt primarily with issues related to the validity of the Strange Situation procedure in cross-cultural research. We have shown that the discussion of these issues has assumed a particular importance in light of the international data sets that have demonstrated inconsistencies in distributions across and within cultures. Specifically, we have shown that the relative proportion of infants classified as secure and insecure is not the same, and that the ratio between the A-avoidant and C-resistant groups often varies as well. Also, inconsistencies seem to characterize samples within the same culture (i.e., the various studies conducted in the Federal Republic of Germany). Moreover, the composition of the various subgroups within the secure categories is not the same across cultures. For example, whereas the B3 infants have been reported to be the modal subgroup in the research conducted in the United States, the B1 infant is most characteristic of the German sample. A number of alternative explanations were proposed in this chapter to account for such inconsistencies. First, it was proposed that the psychological meaning of the Strange Situation may differ for infants and adults in various countries. It was suggested that the studies focusing on the behavior of infants during pre-separation episodes may shed more light on this critical issue. Second, there are some indications, albeit not systematically documented, that the Strange Situation procedure has not been implemented in a similar way in the different countries, and the results may thus be procedurally specific. Moreover, in one of the Japanese studies (Takahashi, 1982) it was indicated that substantial modifications in the procedure were necessary in order to avoid violating maternal expectations. This necessity was made evident in the Israeli kibbutz study as well, in which about a third of the sessions had to be modified or abbreviated in some way. Recently, it has been reported that this was the case with the second Japanese cohort (Takahashi, 1986). Thus, a growing awareness of the necessity of modifying the procedure may suggest that the Strange Situation should be tailored to specific cultural circumstances. Third, issues of classification have been shown to be of major relevance. In this context it is clear that different researchers assign different meanings to the categories (secure versus insecure) associated with the procedure, so that the classification system is implemented in different ways. For the same reason, groups and subgroups are differentially combined by various investigators to form more general groups.

The issues discussed above have implications for research concerned with the antecedents and consequences of Strange Situation behavior. For example, the combining of the B (secure) and the B4 (dependent) subgroups into a single group, as opposed to the combination of the B4 and C (resistant) subgroups, suggests the existence of different hypotheses related to antecedents. In employing the first combination strategy, researchers are implying that infants in the B and B4 subgroups have similar antecedent histories whereas in employing the second strategy their implication is that the B4 (dependent) infants have backgrounds similar to the C-type (resistant) infants. Problems with investigating Strange Situation behavior emerge when different systems of combining subgroups are applied.

Another problem in the study of antecedents is related to their operational definition. More specifically, the studies just reviewed have shown that there is a lack of uniformity in the type and depth of the measures employed, with the result that generalizations are more difficult to establish. Moreover, the concept of maternal sensitivity, which is so central to antecedent research, has not been sufficiently defined and clarified. Unfortunately, not enough attention has been devoted to culturally idiosyncratic styles of parenting that may elucidate the concept of sensitivity. Recently, Grossmann and his colleagues in their efforts to account for the large number of avoidant infants found in their sample, have attempted to expand their investigation of this issue.

The problems and difficulties discussed so far have raised a number of serious questions concerning the nature of the conclusions that can be reached on the basis of the research to date. The findings reported by investigators in different countries suggest that the conclusions are somewhat too far-reaching in regard to the supporting data that have been brought forward. None of the studies carried out in the field offer sufficient data to conclusively support the hypotheses that have been proposed regarding the origins and consequences of Strange Situation behavior in different cultural contexts. At best, these studies suggest important directions for future research. The fact that some of the conclusions greatly exceed what the data would warrant may be accounted for by the way a knowledge base evolves in any field, and all the more so in one that is characterized by strong convictions about the nature and origin of attachment. Internationally, investigators in this field have been inspired by ethological theory. Expectations regarding attachment distributions have been based on the patterns found in the United States and these were assumed as a matter of natural course to be universal. It was disturbing, therefore, when investigators realized that their data were inconsistent with the American "norms" which constituted the first empirical base for modern human ethology.

It should be noted that during the first phase of the implementation of the Strange Situation procedure in countries outside the United States, researchers did not join forces to generate a coordinated and meaningful utilization of the procedure. This is not surprising. Indeed, it is entirely natural that the initial phase of cross-national attachment research was not characterized by international collaboration. During this initial phase, investigators felt compelled to explain their findings in a manner consistent with the general theoretical framework suggested by Ainsworth and her associates. Obviously, many of the explanations were of a post hoc nature, and were marked as well by a variety of cultural idiosyncracies. Thus the total picture was not always coherent. This circumstance is reflected by the fact that there were differences of approach in defining sensitivity, in combining subgroups and groups, and in selecting the antecedent and outcome variables. This state of affairs is quite legitimate in the early phase of knowledge building. The cost, however, is that we are as yet unable to formulate definite conclusions about the data. We have at best reached a stage at which we can formulate better and more refined hypotheses, and develop new measures which will improve our utilization of existing procedures. It follows that there is an immediate need for greater coordination in the planning and conduct of research in this area. We have identified major problems and difficulties in the field, so that the time has come to establish something like a consortium of attachment research.

Before concluding this chapter, we should draw the reader's attention to a number of issues we have not dealt with, but which deserve to be mentioned, if only briefly. First, adult behavior in the Strange Situation has been almost totally neglected. For a better reciprocal assessment of infant-adult attachment relationships to be obtained, greater attention has to be given to adult behavior, especially in consideration of the different norms and values adults bring to the Strange Situation from their various cultures. Similarly, albeit in a different context, it has recently been suggested by researchers (Sagi & Lamb, 1985; Lewkowicz & Lamb, 1985) that information derived from evaluation of the Strange Situation by non-expert raters may offer important insights for understanding behavior in different ecological contexts.

In a similar vein, Beller and Pohl (1986) have developed a revised Strange Situation procedure which is implemented at home. In the modified paradigm, the mother leaves the room to respond to a telephone call and her departure is thus more ecologically appropriate. Since one of the major purposes of this chapter has been to highlight the importance of gaining a better understanding of the meaning of Strange Situation behavior, we would do well to focus our attention on infants' responses to this modified procedure. Grossmann and his colleagues (in press), who were also motivated by the necessity to better understand the meaning of the Strange Situation, have developed alternative ways of evaluating Strange Situation behavior by assessing in detail facial expressions displayed by infants.

It should be reiterated that relating to attachment theory and research only via the Strange Situation is too narrow and does not represent the attachment concept in its wider perspective. Recently, attempts have been made to increase our understanding of the concept of attachment by exploring the notion of internal working models as they relate to attachment (Bretherton & Waters, 1985; Main, Kaplan, & Cassidy, 1985). It is our hope that by employing a variety of different methods for evaluating and analyzing attachment behavior in the standardized Strange Situation, and by using modified procedures, as well as other methods which increase the convergent validity of the concept assessed, it will be possible to progress toward a better understanding of early parent-infant relationships.

The research and difficulties we have reviewed suggest that at the present time we should make a distinction between Strange Situation behavior and security of attachment. Perhaps better coordinated research, as we have suggested, will lead to an era in which the concept of the security of attachment will be better understood.

Notes.

1. The authors would like to thank Shirley Feldman, Klaus Grossmann, and Marinus van IJzendoorn for their comments on previous drafts of this paper, and Ted Gorelick for his editorial assistance.

2. A full report of this study is not yet available. Based on information provided by Beller (personal communication), the sample does not seem to differ in sociometric background from that of the Bielefeld and Regensburg samples.

3. In the most recent publication of the Japanese cohorts (Takahashi, 1986), the B3 infants seem to account for most of the variance within the secure group. This difference needs to be further explored.

4. As can be seen in Table 1, the Dutch infants were approximately two years old at the time they were assessed in the Strange Situation. These infants are older than the age for which the procedure was originally designed. Thus, it is possible that the greater proportion of B1-type infants is accounted for by this factor.

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